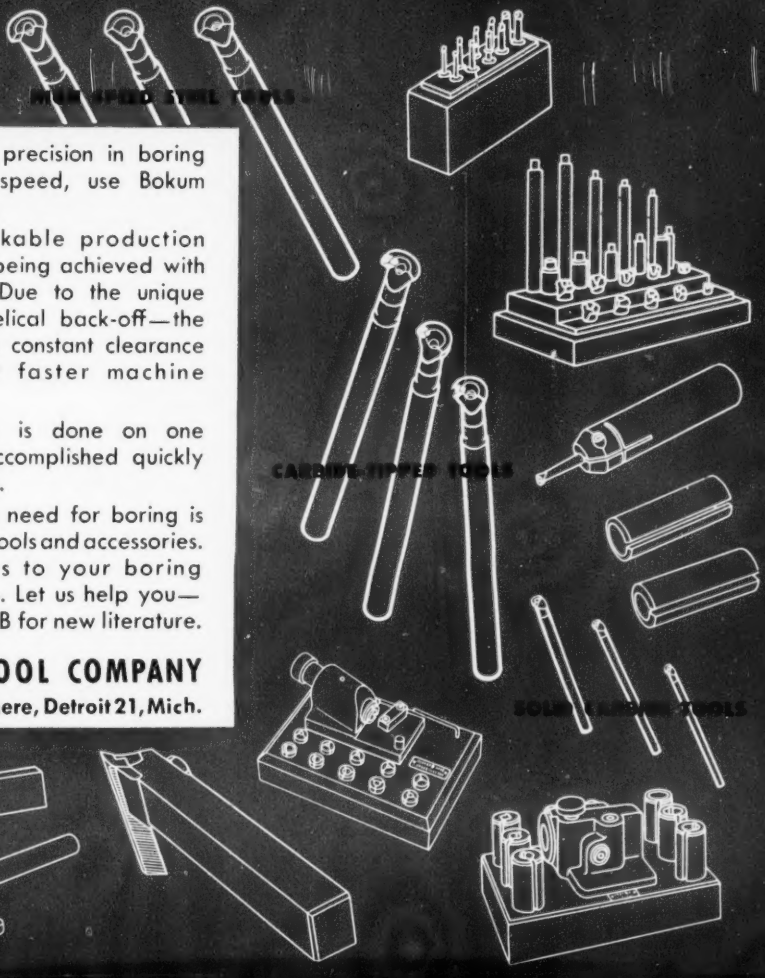
MAY, 1952

MODERN Machine Shop

HERE'S EVERYTHING FOR

PRECISION BORING AND INTERNAL THREADING



If you want precision in boring as well as speed, use Bokum Boring Tools.

Most remarkable production records are being achieved with these tools. Due to the unique design—a helical back-off—the tools provide constant clearance and permit faster machine operation.

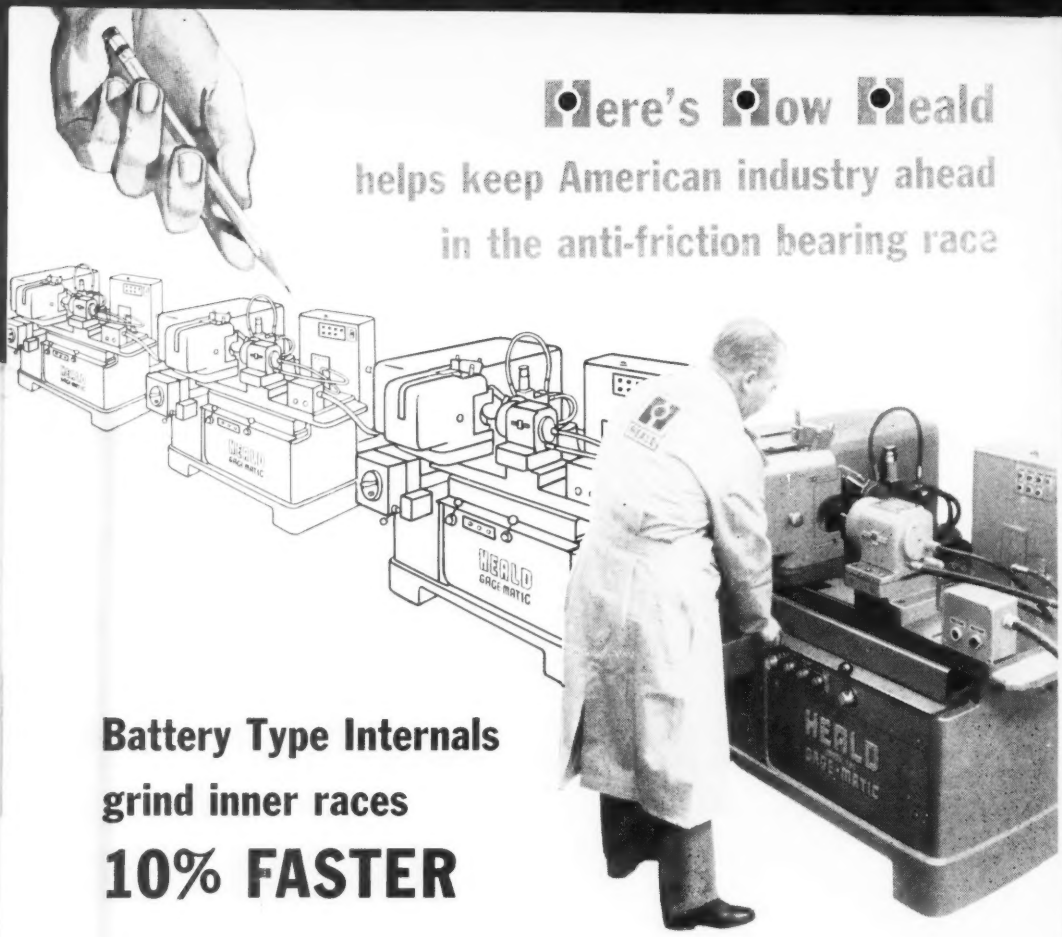
Resharpening is done on one face only. Accomplished quickly and precisely.

Anything you need for boring is at Bokum's—tools and accessories. Yes, answers to your boring problems, too. Let us help you—send to Dept. B for new literature.

BOKUM TOOL COMPANY
14775 Wildemere, Detroit 21, Mich.

Here's How Heald

helps keep American industry ahead in the anti-friction bearing race



Battery Type Internals grind inner races

10% FASTER

Ten per cent may not seem like much. But in anti-friction bearing production, it's a pretty substantial increase. For these parts are turned out by the millions — and seconds saved per part mean hundreds of extra bearings per day. What's more, this increase is in comparison to previous production on high speed automatic machines. The savings therefore directly reflect the advantages of a Heald Battery Type installation.

Within certain limitations, any reasonable number of battery type centerless internals can be used, depending on production requirements. The important thing is that these Heald machines are specially designed for operation from a central hydraulic power unit, central coolant supply, and central hi-frequency electric power source where applicable. Machines are smaller, permitting a more compact group assembly. Controls are designed for easier operation. And because they are *fully automatic*, several machines can easily be tended by one operator. That means important savings in manpower, as well as in initial investment, maintenance and operating costs. Remember—when it comes to precision finishing, it pays to come to Heald.

HEALD

Heald machines speed the nation's production

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 24 NUMBER 12
MAY, 1952

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Published monthly and copyrighted (1952) by

GARDNER PUBLICATIONS, Inc.
431 Main St., Cincinnati 2, Ohio

Printed in U. S. A.

Acceptance under Section 34.64, P. L. & R., Authorized

MODERN Machine Shop

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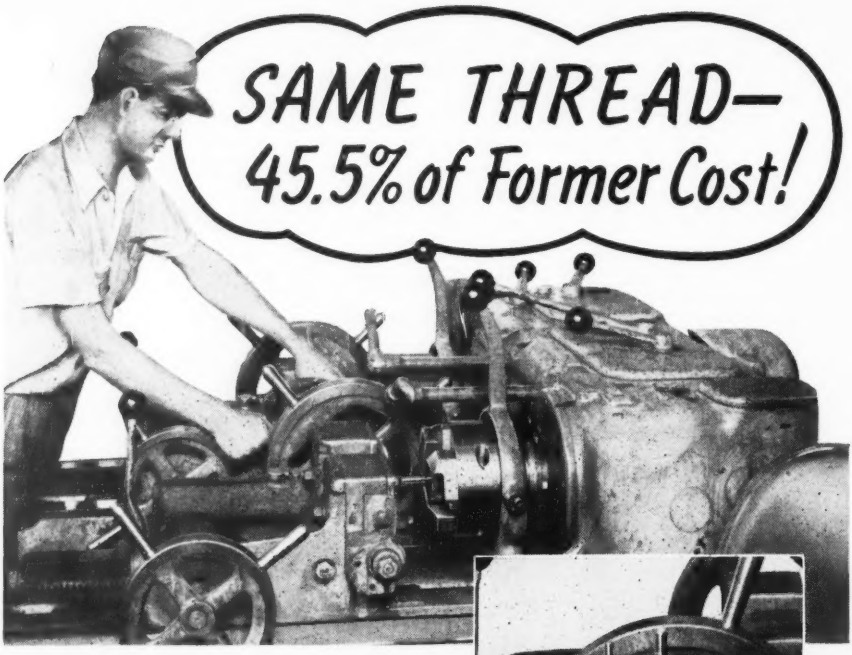
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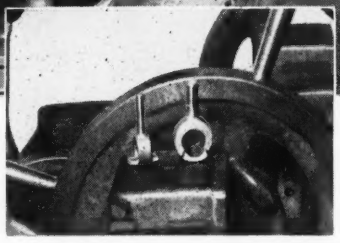
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SAME THREAD— 45.5% of Former Cost!





Eye bolts, for use in the assembly of switchgears, are now threaded on 1" Double LANDMACO Leadscrew Threading Machines in the Philadelphia plant of a large Eastern manufacturer. Records show that costs by previous methods averaged 120% higher.

Three sizes of eye bolts are threaded from high tensile bronze and copper castings—$\frac{3}{8}$", $\frac{1}{2}$", and $\frac{5}{8}$". 16, 13 and 11 pitch National Coarse threads respectively are cut for lengths varying from $1\frac{5}{16}$" to $1\frac{5}{8}$" at cutting speeds of 302 and 217 RPM's.

Lower tool cost has been an important factor in the overall cost reduction from threading these parts with LANDIS Equipment. Approximately 25,000 pieces are produced between each regrinding of the chasers. This combined with the fact that LANDIS Chasers are reground and used for most of their original length has brought tool cost down to a minimum.

This is one of many examples where LANDIS Threading Equipment has significantly reduced operating costs—others show increased production, better quality, lower maintenance, etc. Further information on LANDMACO Leadscrew Machines and all LANDIS Threading Equipment will be furnished promptly on request. Give specifications when writing.

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

POLISHING·GRINDING·PRINTING MACHINERY

1882
1952

70 YEARS YOUNG

Hammond
OF KALAMAZOO
"GOOD MACHINERY SINCE '82"

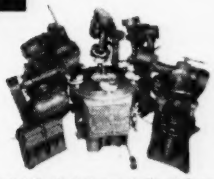
Hammond Machinery Builders INC.

There is no substitute for EXPERIENCE

With the new and better constantly coming into the picture and the old going out, these 70 years have not been long.

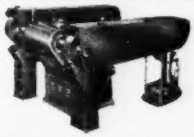
Even so, they have piled up a big bank of experience to which we add and draw from each day.

We are grateful for the confidence of tens of thousands of HAMMOND users. For them and for all, through ever broadening research, engineering, and production, we propose to insure another 70 active and eventful years.



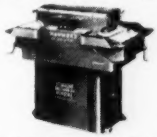
Model K-46-6 Super 5 Head Rotary Automatic. (One of a line of Rotary, Strait-Line, and Jr. Automatics).

WRITE FOR CATALOG A-50



Model VRO "DIAL CONTROLLED" Variable Speed Polishing Lathe with Model 3-A (air-tensioned) Backstands.

WRITE FOR CATALOG A-60



Model 14-WD Wet or Dri Carbide Tool Grinder with 2—14" dia. cup wheels. Model 14-SWD available with a straight and a cup wheel.

WRITE FOR CATALOG B-225

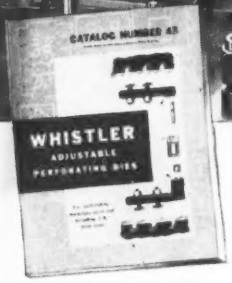
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1615 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

Get into Production in a few hours with

WHISTLER ADJUSTABLE DIES





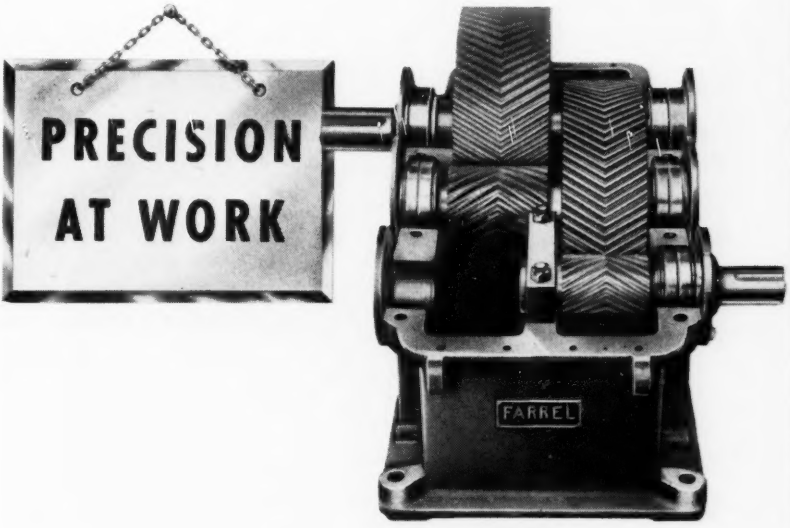
There are plenty of other advantages in using Whistler Adjustable Dies. It makes sense to get the complete story. And it's easy to do. Write for your Whistler Catalog today.

Whistler perforating dies now offer a double-barreled advantage in getting into production faster. Standard sizes of round hole punches and dies... 1/32 to 3"... can be shipped promptly. Special shapes... squares, ovals, rectangles, group and notching dies, are quickly made to order.

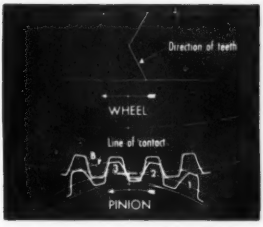
Equally important, set-ups are simple... take only a short time. Same units can be rearranged or units added in setting up different jobs. Production is thus speeded while die costs are amortized through continued re-use. No special tools are needed. All parts are interchangeable. The heavy duty series of punches and dies easily pierce materials up to 1/4" mild steel.

S. B. WHISTLER & SONS, INC.

740 MILITARY ROAD • BUFFALO 17, NEW YORK



The quiet, vibration-free performance of Farrel herringbone gears is the result of extreme accurancy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. Why these gears continue to operate so quietly, after many years of service, is shown by the diagram illustrating the nature of the contact between a pair of Farrel gears.



The lines of contact are oblique across the face of the teeth, and the pressure is evenly distributed over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly.

Farrel herringbone gears are made of the finest grade materials, in a complete range of sizes from ¼ inch to 20 feet in diameter. Write for further information or for engineering assistance.

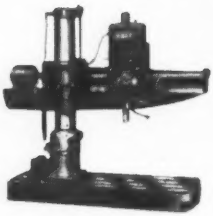
FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

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Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

FB-744

wide-angle visibility really saves time





'Round the clock—day after day—time savings pile up with Gilbert radial "comfort-level" operation. The operator can put the arm down (for comfort as well as minimized deflection) and still have full view of the work because (1) the spindle is close to the arm and to the front face of the head and (2) the bottom of the head extends only a short distance below the lower vee of the arm. All controls are *right at hand*, easy to reach and finger-tip sensitive, keep fatigue *down*, production *up*.

WRITE FOR BULLETIN 349.

THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
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those who buy Gilbert buy Gilbert again

GISHOLT'S *easier operation*

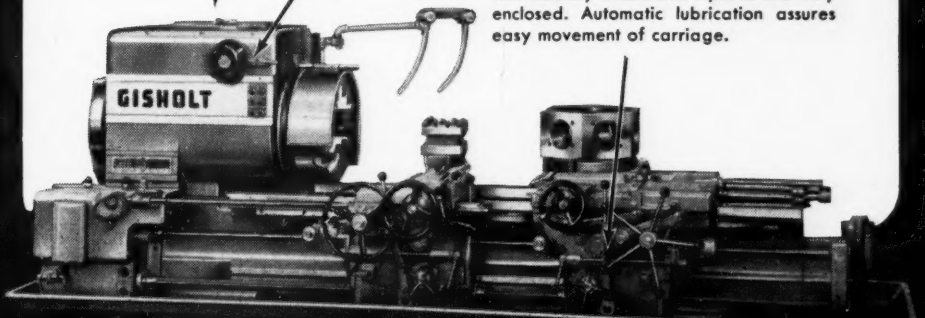
saves you time and money...

This 21,000 lb. machine requires no more operating effort than turret lathes ⅓ its weight. Despite its great power and rigidity for heavy-duty work, the new Gisholt 4-L is so fast and responsive, it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster—more nearly constant throughout the day.

1 **Hydraulic Speed Selector** eliminates manual gear shifting. Spindle speed changes are made instantly by power without stopping the spindle or releasing the main drive clutch. Can be operated either direct or pre-set.

2 **Central control panel** eliminates manual effort. Provides responsive finger-tip, push-button control for start, stop, reverse, inching, chucking, and coolant supply. Automatic braking brings the work smoothly and quickly to rest.

3 **Easy selection of feeds** is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.



The new Gisholt 4-L Saddle Type Turret Lathe provides 31⅜" swing over the ways, 27" swing over carriage wing, 9½" to 12½" spindle bores and 63" longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier operating Gisholt as applied to your specific machining requirements. New literature is available.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



The latest method of harnessing CINCINNATI FILMATIC Centerless Grinders together simplifies sizing adjustments and resetting. It works this way:

A Feedmatic Hopper automatically loads the work in the first machine. Thereafter, individually motor driven conveyors take over. They are mounted on the machines at the entrance side of the grinding throat and freely supported at the rear of the preceding machine. As the work leaves one machine, it is dropped on the conveyor for the next machine by a counter-weighted escape device. Thus each unit can be individually adjusted without affecting the others, and it is unnecessary to maintain a straight line laterally.

To improve surface finish beyond the best obtainable by grinding, a CINCINNATI FILMATIC Centerless Lapping Machine can be placed at the end of the line of Centerless Grinders, as illustrated. Setups of this type produce exceptionally high-quality work, with very little attention from the operator at

FILMATIC CINCINNATI **CINCIN**

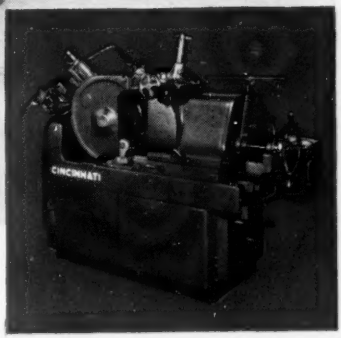
problem here... setup grinds and laps work



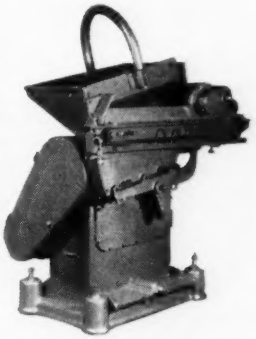
Grinding rocker arm shafts, 16¾" long; removing .015" to .020" stock on 170 shafts per hour. Shafts are selectively hardened, and delivered to the grinder in varying degrees of straightness. The production line consists of five CINCINNATI FILMATIC No 2. Centerless Grinders and one CINCINNATI FILMATIC Centerless Lapping Machine.

each end of the line. ¶CINCINNATI FILMATIC Centerless Grinders offer many advantages for continuous line production or job lots. FILMATIC grinding wheel spindle bearings will never fail; lubrication, including the infeed slides, is automatic; electrical control elements are built-in. And, to top it off, Cincinnati Application Engineers will be glad to help you with your high priority production problems.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



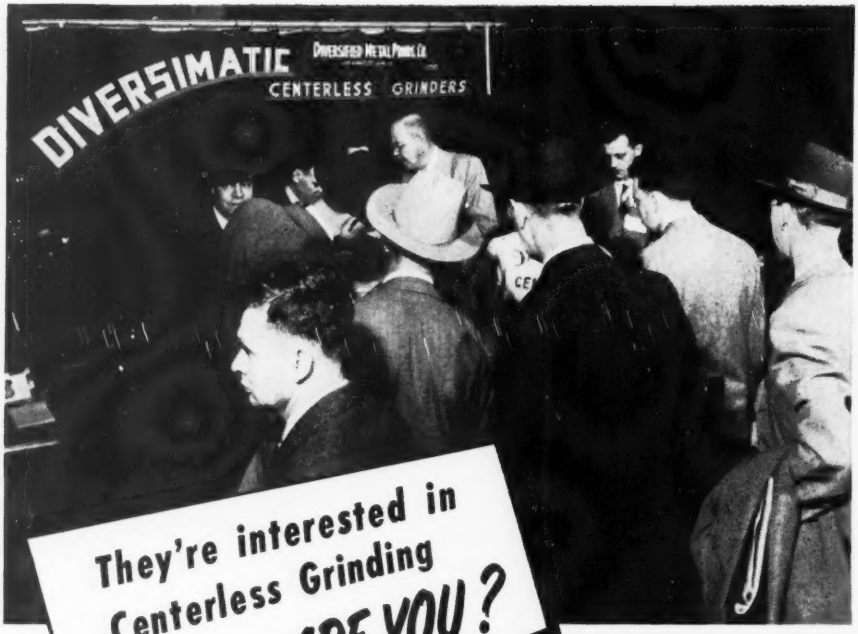
CINCINNATI FILMATIC No. 2 Centerless Grinder. Complete specifications may be obtained by writing for catalog No. G-611.



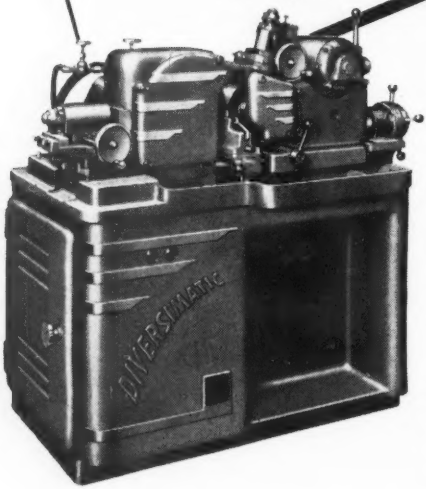
CINCINNATI Feedmatic Hopper. Type E for thrufeed work is illustrated. Also available, Type B for infeed work. Catalog No. G-575-1.

NATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES



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8 WEEKS!

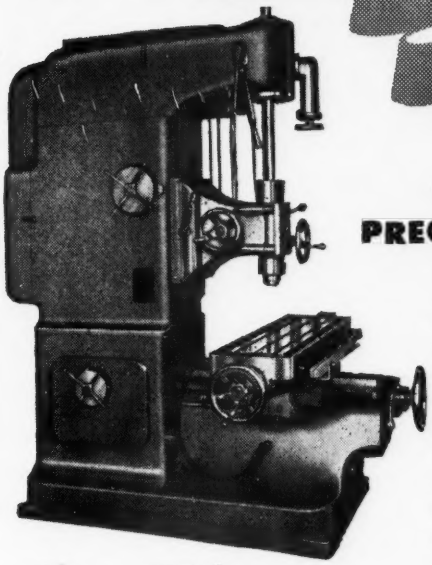
Over 25,000 enthusiastic viewers approved this centerless grinder at the recent Chicago ASTE Show. Hundreds commented "just what we need for our small diameter jobs!"

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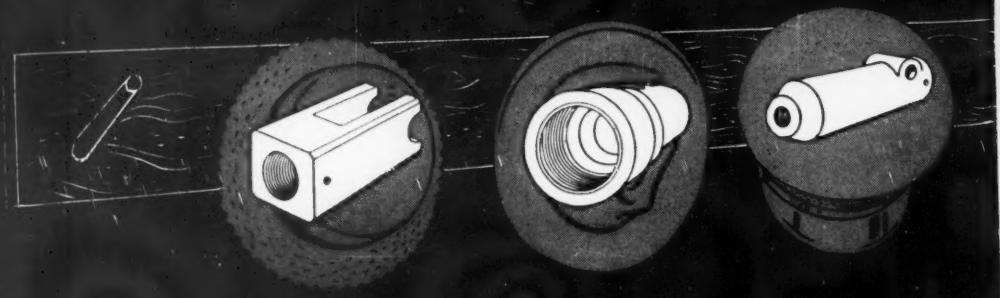
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W. B. KNIGHT MACHINERY COMPANY

3920 West Pine Blvd. St. Louis 8, Missouri

a thousand jobs



One of the lathe line-ups at the C. B. Christiansen Machine Shop, Newark, New Jersey. In this shop you'll find 2 Heavy Duty Engine Lathes, 10 Regals, 1 Sliding Bed Gap Lathe and 1 Rapid Production Lathe . . . all LeBlonds! Recent jobs ranged from a 67" diameter ring gear down to "57 varieties" of "watch charm" work.



for quick-change artists



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As Don Phillips of LeBlond's New York Office puts it, "It's pretty hard for anyone except LeBlond to have such all-around satisfied customers as Christiansen. No matter what kind of turning Christiansen's business calls for, one of our standard LeBlond Lathes fills the bill exactly.

"LeBlond men never have to recommend an 'almost-right' lathe simply to get the order. That's where our customers' confidence in LeBlond really starts." From the 13″ Regal to the largest Automatic Crankshaft Lathe, LeBlonds are easiest to select, easiest to apply with certainty to a specific job . . . and the surest producers of profitable metal turning. Call in your LeBlond Distributor, or write Cincinnati. Start now. Learn what that "confidence" Don Phillips mentioned can mean to you.

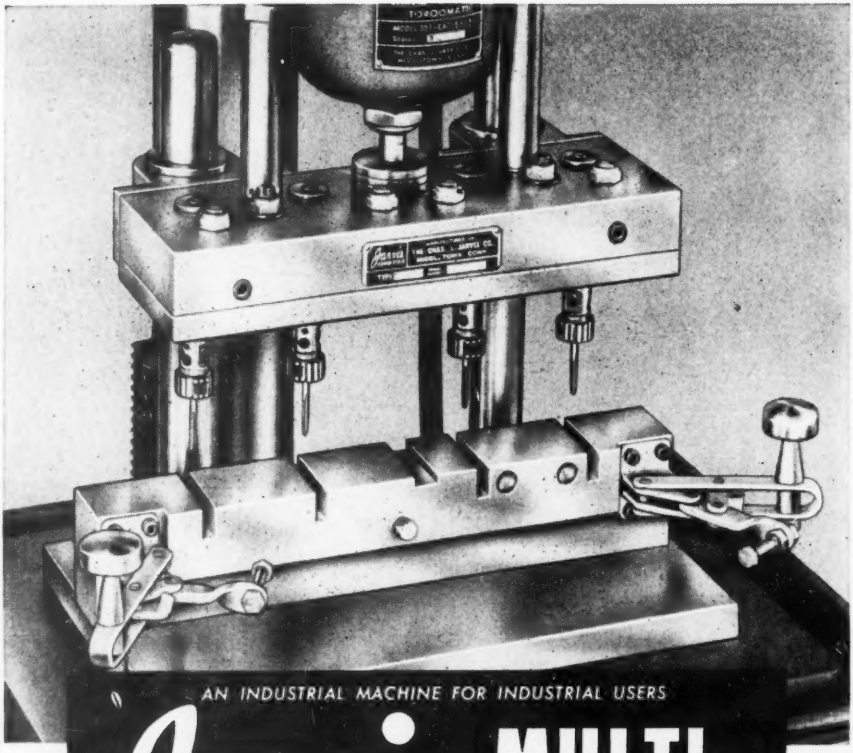
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Catalog E to find the right lathe for your job.

turned faster by

LeBLOND *of Cincinnati*

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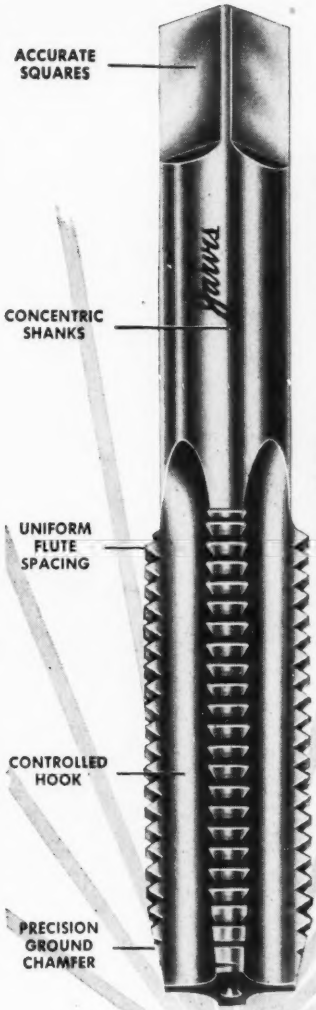
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for MULTI-TAPPING AND DRILLING

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THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



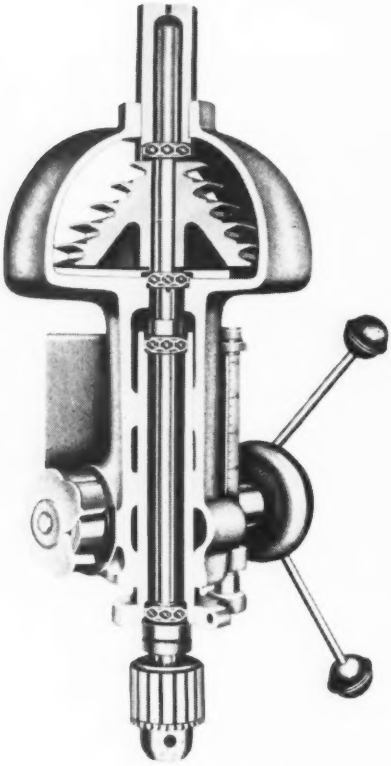
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Jarvis TAPS

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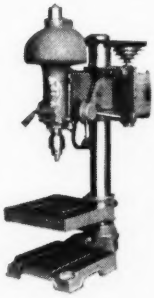
JARVIS *POWER* TOOLS } TAPPING ATTACHMENTS · TAPS · FLEXIBLE SHAFTS AND MACHINES · ROTARY FILES · TUNGSTEN CARBIDE REAMERS AND MILLS · DRILLS · BORING BITS

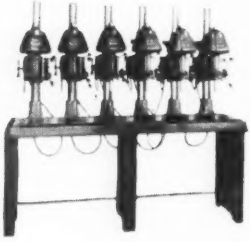
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



top quality







Top-quality head constuction with full floating spindle drive and four sealed-for-life ball bearings—plus C-O Cincinnati's exclusive hinged motor bracket that makes belt-shifting a snap—are two of many practical features that make 16" and 18" Royal bench and floor drills "of outstanding value."

These precision drilling units, backed by a nationally recognized builder of fine machine tools, give you more quality features at economy prices. Prove it yourself. Run a Royal for half a minute and you'll get the feel of quality construction: smooth operation, and fast work. Shipped from dealer stocks near you. Write for Catalogs D-100 and D-101, and the name of your nearest representative.

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You'll Want This NEW Book!

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NOW SUB-ZERO CHILLING FOR THE SMALLER SHOP!

- **SHRINK FIT WITHOUT FORCING!**
- **GET 100% STABILIZATION OF ALLOY STEEL!**
- **INCREASE PERISHABLE TOOL LIFE!**



Sub-Zero Model W-120 Chills 20 lbs. of steel per hour to -120°F

Built specially to meet the requirements of smaller shops, the *new* Model W-120 Sub-Zero Chilling Machine has a thermal capacity to remove 500 BTU's per hour . . . cooling as much as 20 lbs. of steel to -120°F. per hour.

By Sub-Zeroing, important treating functions are performed in a fraction of the time formerly required. The cause of dimensional change is eliminated through Sub-Zeroing and drawing until 100% transformation of austenite to martensite is effected. Growth and warp is thus stopped.

Sub-Zeroing also increases perishable tool life . . . and, slashes time on shrink fit assembly.

For full details write for new catalog

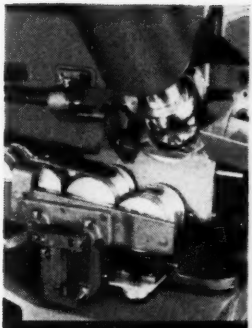
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MANUFACTURING DIVISION
Deepfreeze Distributing Corp.
3932 READING ROAD CINCINNATI 29, OHIO

Some exclusive territories are now open to dealers. If you are a machine tool dealer, and are interested, write for full information.

. . . untouched by human hands!

. . . to plus-or-minus .035 oz.!

. . . at 12 per minute rate!



. . . by this amazing new

Morris

AUTOMATIC PISTON BALANCING MACHINE

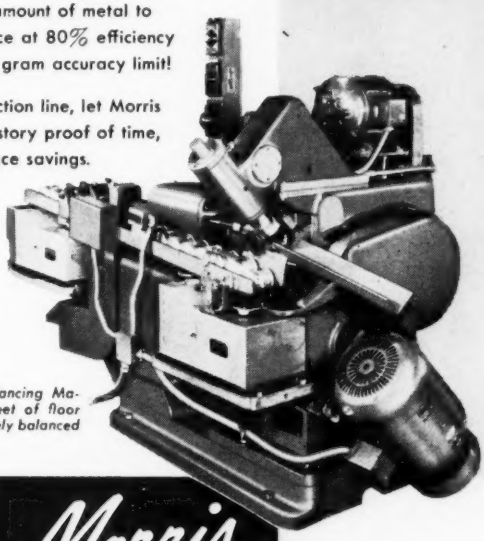
pistons balanced automatically

Pistons are unloaded automatically from a standard conveyor, processed or rejected and returned to the conveyor "untouched by human hands."

Underweight or grossly overweight pistons are automatically rejected without interrupting the production flow. Production is 450 to 720 parts per hour varying with the amount of metal to be removed from each piece at 80% efficiency and to a plus-or-minus one gram accuracy limit!

If you have a piston production line, let Morris Engineers show you case history proof of time, labor, money and floor space savings.

Write today for NEW bulletin describing and illustrating the revolutionary MORRIS Piston Balancing Machine.



The Morris Automatic Piston Balancing Machine takes only 27.3 square feet of floor space to turn out up to 12 accurately balanced pistons every minute!

a better product at less cost with precision PLUS *production*

Morris

THE MORRIS MACHINE TOOL COMPANY, 934 HARRIET ST., CINCINNATI 3, OHIO

"For that Specialized Drilling Job ..."Buy" MORSE!"

There's something special about the way Morse makes even *regular* drills. For example, take a close look at these three special-purpose drills:

A ***MORSE Cotter Pin Drill*** — Made with slightly heavier webs than General Purpose Drills. Able to withstand sudden torque and bending. For drilling sheet metal, cotter pin holes in shafting, and poor quality castings.

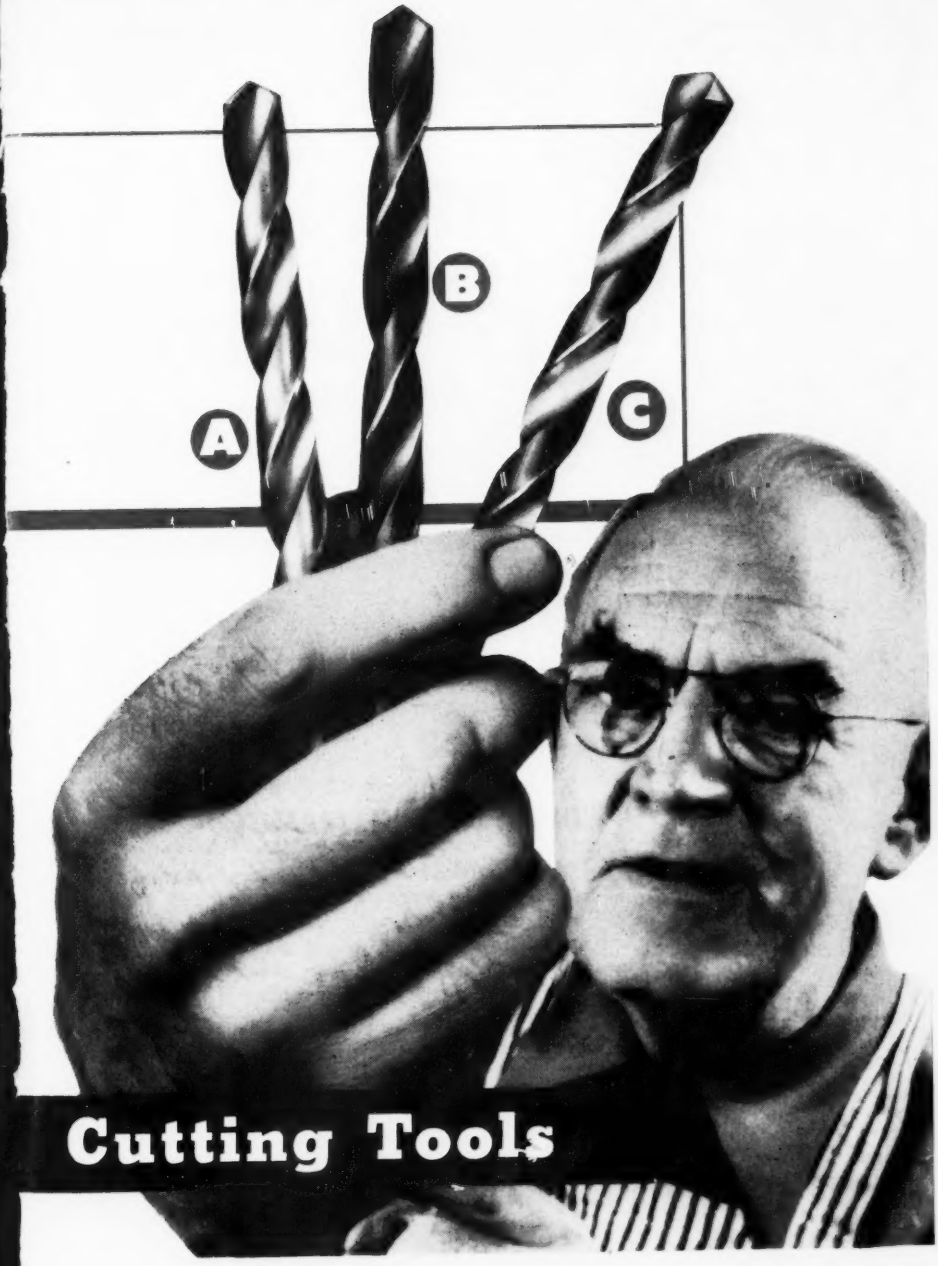
B ***MORSE Heavy Duty Drill*** — Made with heavy webs for greater rigidity for use in power-fed equipment. Used in stainless or spring steels, hard cast-iron, monel, and heat-treated metals, near the limit of machinability.

C ***MORSE Redrawn Drill*** — In addition to the drawing or tempering regularly done to all Morse High-Speed Drills, this particular type is given a *redraw* . . . an additional heat treatment which tends to relieve stresses, and lends *extra toughness* to the drill.

But no matter what type of drills you need . . . regular or special-purpose . . . *first* talk it over with your Morse-Franchised Distributor. He has the know-how and the stock to help you get more results from every drill-dollar you spend. *Call him today.*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Div. of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

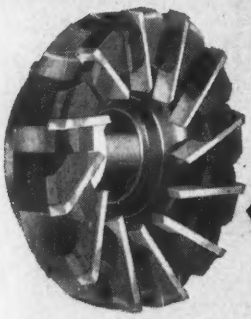
MORSE



Cutting Tools

Tool Saving Tips

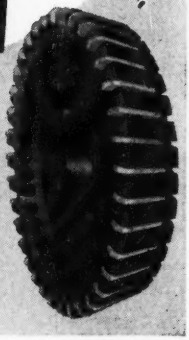
Use these NEW IMPROVED Inserted Solid Blade KENNAMILLS



"KF" for STEEL
And Heavy Cast Iron Milling

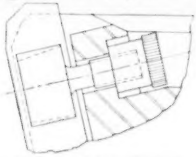
"KF" radial type Kennamill has solid Kennametal blades. For production jobs on steel, and heavy cuts on cast iron. Standard sizes 6", 8", 10" and 12".

"MF" for CAST IRON



"MF" axial type Kennamill has solid Kennametal blades—more per inch of cutter diameter than the "KF"—for high production runs on cast iron. Standard sizes 6", 8", 10", and 12".

Simplify SET UP, DISMANTLING, MAINTENANCE



NEW! ONE PIECE WEDGE AND SCREW

The shank of the stud-type, heat-treated alloy steel wedge extends through the cutter body. The wedge is pulled down, and blade secured, by turning the Allenut — easily accessible at the back of the cutter.

• These precision-built cutters feature strong, long-lasting, solid Kennametal blades — positioned, supported, and wedged by a new, improved design that assures maximum milling service from each unit of carbide consumed. (See sketch at left.) No threads in the cutter body; possibility of "freezing" eliminated.

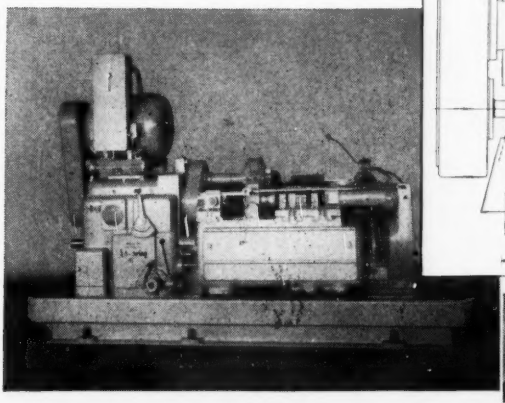
Blades can be precision set. Wedges and blades for all sizes of each type cutter are interchangeable. For complete particulars see Catalog 51, and Supplement 2.

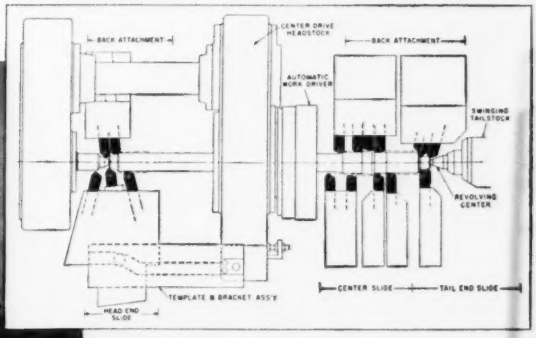


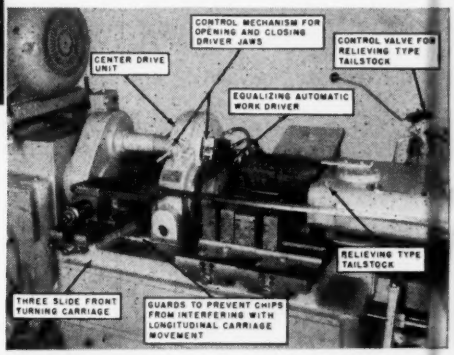
KENNAMETAL Inc., Latrobe, Pa.
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE Lo-swing PEOPLE"** SENECA FALLS, NEW YORK







MODEL AR AUTOMATIC "CENTER-DRIVE" Lo-swing LATHE CUTS COSTS ON REAR AXLE DRIVE SHAFTS

Problem: Turn, face and chamfer simultaneously both ends of Rear Axle Drive Shafts.

Solution: The Model AR Lo-swing Lathe selected for this job is equipped with a Heavy-Duty Center Drive Unit fitted with an equalizing automatic work driver having three jaws. This design provides an efficient method of *supporting* as well as *driving* the shafts. The work driver is opened and closed with an air-operated rack which revolves the pinion fitted to the work driver as illustrated below.

A relieving type tailstock is provided to permit easy, straight line loading and unloading of axle shafts. The hinged portion of the tailstock swings in an arc and is operated by an air cylinder from the control valve shown below.

The line drawing, above, shows the tooling supplied for the machining operation; the dotted lines indicating the approximate amount of material removed from the forgings. The front turning tools all cut simultaneously, and the rear tools, mounted on two automatic back squaring attachments, are timed to complete the finishing of the shoulders five seconds after the front turning tools have ceased cutting. This assures accurate dimensions and excellent finish.

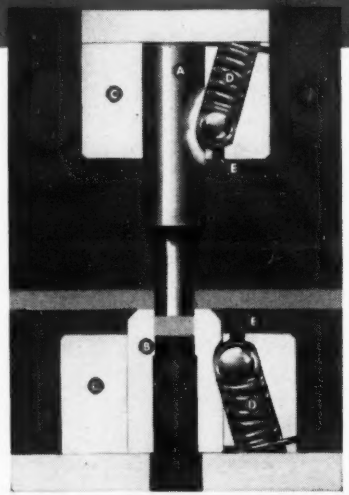
Seneca Falls engineers welcome inquiries involving difficult and unusual machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

You Save Time with R-B PUNCHES and DIES

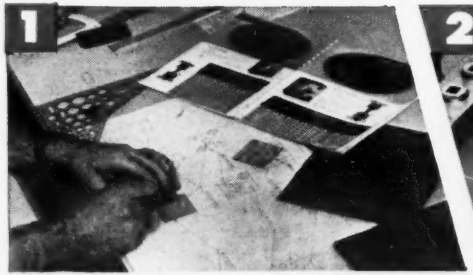




How They Work . . .

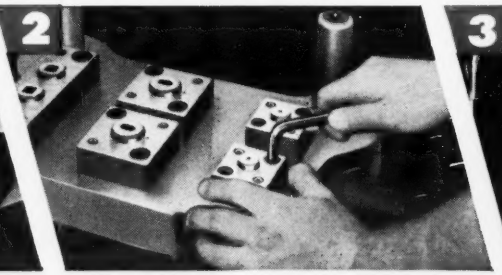
R-B punches (A) and die buttons (B) are locked in standard or special retainers (C) which are mounted on the die shoes. A spring-loaded ball lock (D) produces positive radial alignment and vertical locking; *no additional keying is necessary regardless of the size or shape of the punch.* Up to ¾" stock can be pierced. R-B punches and dies are easy to insert; push and twist and they're locked. They're easily removed, too. Retainer holes (E) provide for insertion of tanged tool which releases ball and allows instant removal.

How They Save Time



IN DIE DESIGNING

R-B standardized retainers are available in three shapes and many sizes, and where necessary, R-B special retainers can be supplied. You save "time on the board" because you are working with *standardized* equipment.



IN DIE CONSTRUCTION

R-B punch and die retainers and special retainers are quickly, easily and accurately mounted without special machining. With them, you can save much of your skilled die-makers' time.



IN DIE OPERATION

HERE'S WHERE YOU *REALLY* SAVE. R-B punches and dies cut press down time for replacement to a minimum. They're instantly removed—quickly changed—yet accurately aligned when locked.

TOOL STANDARDIZATION IS THE BASIS FOR EFFICIENT AND ECONOMICAL PRODUCTION. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.

ALLIED PRODUCTS CORPORATION
RICHARD BROTHERS DIVISION
DEPT. 63 • 12625 BURT ROAD • DETROIT 23, MICHIGAN

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ALLIED'S FOUR PLANTS
HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

Take Your Toolroom Off the Spot

USE

OLIVER DIE MAKING MACHINES



Increase your efficiency, save time and headaches by installing the OLIVER Method for machine sawing, filing and lapping operations. Oliver Die Makers have proved their efficiency for almost 40 years. Many have been in continuous use for more than 25 years. Noted for their speed, accuracy and long lasting qualities, they have increased toolroom efficiency and effected savings up to 60% in thousands of plants throughout the World. Coupled with this is the fact that Oliver Die Makers are so simple to operate that skilled labor is not required — an important feature in these days of hard-to-get skilled man-power.

Oliver Die Makers available in 5 models —

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

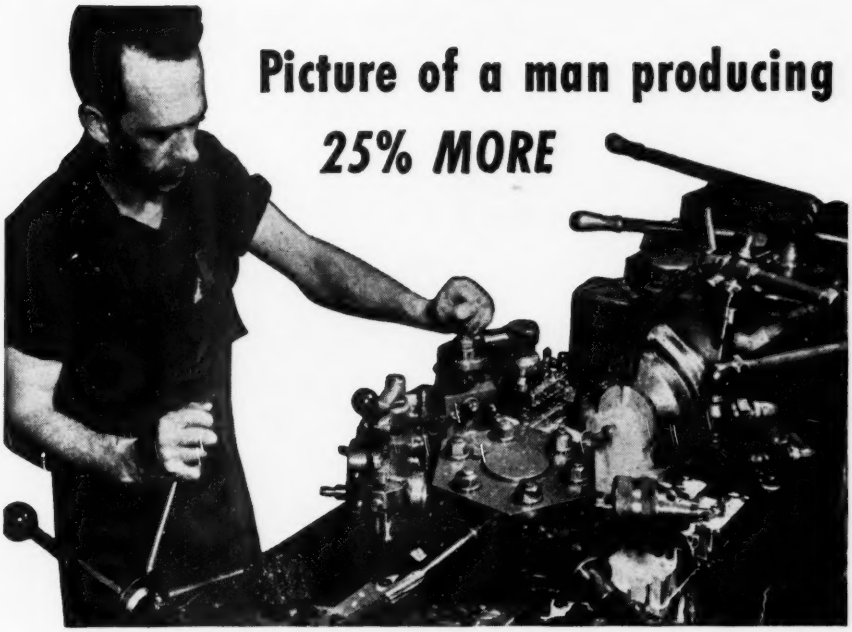
The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write for literature that will save you dollars in your toolroom.

OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES



Picture of a man producing *25% MORE*

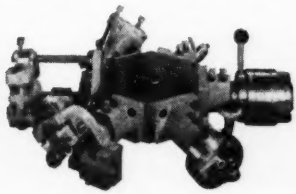
SAME JOB, SAME OPERATION

but better tools!

● Electrol Incorporated, of Kingston, New York, transferred this precision Stop-Plunger job to a Warner & Swasey No. 3 Universal Turret Lathe because it had the speed and accuracy required, as well as the proper tooling for the job. The result was a 25% increase in production of this high pressure hydraulic control part.

This shop has found it can do more jobs faster on Warner & Swasey Turret Lathes with the Standard Tooling Setups that fit their requirements. Multiple and combined cuts, with shorter setup time, mean profitable production increases.

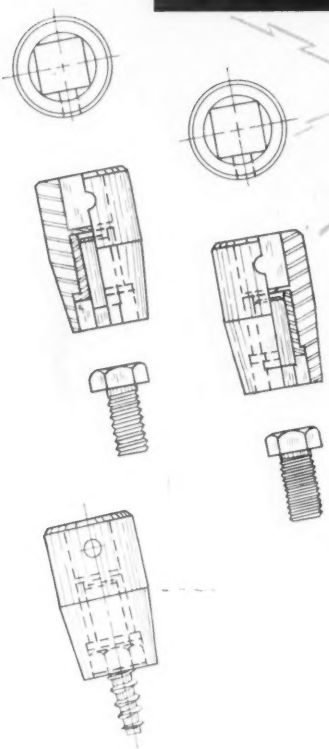
WARNER & SWASEY *Cleveland*



YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

APEX

magnetic sockets



can help you **reduce** production costs

• Your production costs may be higher than they need be — if you're still starting screws by hand. Apex magnetic sockets will reduce costly lost motion, particularly in those hard-to-reach places.

With Apex, you simply slip the screw into the socket, then start driving. The powerful, built-in magnet holds the screw securely in driving position, even when working straight down.

Apex magnetic sockets are available for use with sheet metal screws and commercial cap screws, and have been used to advantage with nuts and bolts. Complete information and prices available without obligation. When writing, please indicate type of screw used and size of hex head.

APEX TOOLS magnetic sockets

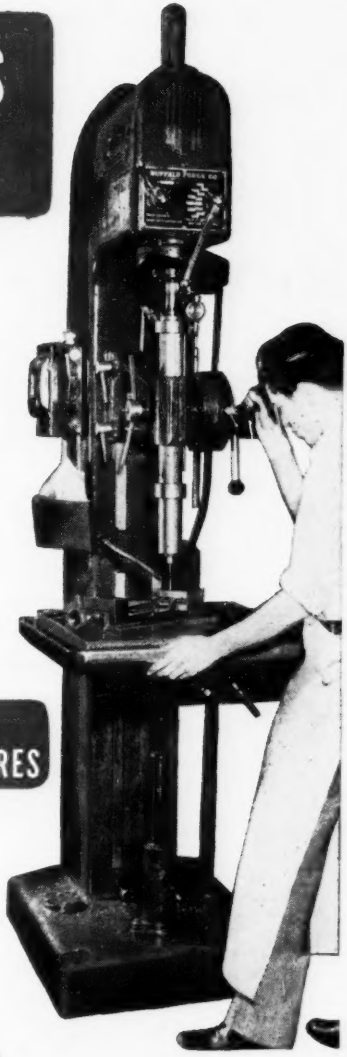
THE APEX MACHINE & TOOL COMPANY
1027 S. Patterson Blvd., Dayton 2, Ohio

POWER BITS, INSERT BITS AND BIT HOLDERS, FOR PHILLIPS, FREARSON (Reed & Prince), SLOTTED, CLUTCH HEAD and SOCKET HEAD SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • TWO-PIECE DRIVERS FOR HEX HEAD SCREWS • SOCKETS, EXTENSIONS, ADAPTERS AND NUT SETTERS • UNIVERSAL SOCKETS, EXTENSION WRENCHES AND ADAPTERS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS.

ELIMINATE DELAYS

in drilling-speed changes

with the RPMSTER



- 101 different speeds at the touch of a lever without stopping motor!
- The right speed for the job *instantly* with RPMster's unique variable speed drive!
- Hundreds of these rugged, accurate 99-inch-high machines saving time and money for industry!
- Ideal for production and job work up to 1½" capacity! WRITE FOR BULLETIN 3257 for all details!

OTHER "Buffalo" DRILLS with HIGH-PRODUCTION FEATURES

From the "Buffalo" No. 14 Drill — with ⅜" capacity and spindle speeds up to 9600 rpm—to the large No. 22 Drill with its 2" capacity in cast iron and 27½" maximum space between work table and spindle shank—there are scores of models to suit your requirements.

WRITE FOR BULLETINS!

Simply let us know your operation, and we will be happy to recommend the most satisfactory solution from your point of view.

BUFFALO "Buffalo" FORGE COMPANY

388 Broadway Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

Everybody's Talking About Brightboy

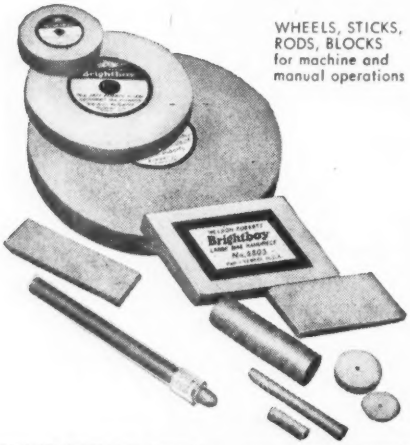


The Abrasive-and-Rubber Revelation For Finishing!

"Try Brightboy." That's what you hear more and more executives, engineers, methods and production men, foremen and bench workers telling one another! That's what you hear when time costs mount, when finishing problems increase, when new production methods and materials must be found. *Try Brightboy!*

WHY? Brightboy can do many things other abrasives can't. Gives you a refreshing, completely new, immensely wider concept of finishing, combines BURRING, CLEANING, FINISHING, POLISHING in one operation. *Cuts finishing time as much as 50%!*

HOW? Brightboy's *action* is the answer. The simultaneous light-grind, smoothing, cleaning—and even polishing—that *abrasive and rubber* achieve working together. *One time-saving operation* combines the production steps following the rough grind right up to the buff.



WHEELS, STICKS, RODS, BLOCKS for machine and manual operations

ON WHAT? On ALL METALS, of course—hard and soft, including thin, lightweight stainless steel, aluminum, dural; gold and silver. PLUS: WOOD, GLASS, HARD RUBBER, PLASTICS, PRESSED AND LAMINATED MATERIALS AND COMBINATIONS.

Ask your dealer for the Brightboy Catalog-Manual outlining uses and adaptations. Write the Brightboy Service Department on any problem where finishing is involved.

DOING DEFENSE WORK — OR MAKING CIVILIAN GOODS? *Investigate the wide adaptability of Brightboy. Proved in defense-production applications (Ordnance, Instruments, Airplane Parts, Internal Combustion and Jet Engines, Electrical, Electronic, Transportation and Communication Equipment) and in manufacture of an almost limitless variety of civilian goods and appliances.*

WELDON ROBERTS

Brightboy

RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
6th Ave. & No. 13th Street Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

This is another of the

"HUNDREDS OF JOBS"

which can be done only on a

MARVEL Band Saw!



MARVEL BAND SAW saved these two 4400 lb. castings

Two sand cores washed out when these giant 4400 pound steel connecting rods were cast, resulting in solid eye ends without gaps. Then came the $64 question—how to machine out the 1½" slots in the longitudinal center of the eyes which were 22" high and had a wall thickness of 6½".

The Ernest J. Nelson Iron Works of San Francisco, did this "impossible" job easily, quickly and economically, without special tooling, on a standard Model No. 8M/2 MARVEL Band Saw. Two cuts were made in each rod in two hours per cut with tool cost of $3.06 per rod. The tool was a MARVEL B9-10 Band Saw Blade.

Every tool room, machine shop and maintenance department needs a MARVEL Series 8 Universal Band Saw—not only for innumerable everyday jobs but for the occasional "trick" operations, where its utmost versatility will save many headaches and dollars.

WRITE FOR CATALOG

These exclusive MARVEL features made this job easy:

1. Large, T-slotted work table.
2. Blade feeds into work vertically; work always stationary.
3. Power-pressure feed.
4. Automatic blade tension.
5. Built-in coolant system.
6. Large capacity.

Metal Cutting MARVEL SAWS

Better Machines–Better Blades

See our CATALOG in SWEET'S FILE

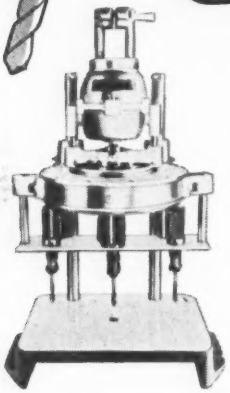
ARMSTRONG - BLUM MFG. CO.

5700 Bloomingdale Ave., Chicago 39, Illinois



It's a snap to switch from DRILL to TAP!

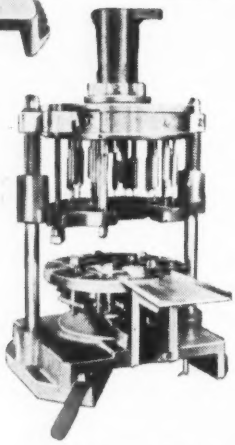
WITH *Ettco-Emrick* MULTIPLE HEADS



Adjustable spindle heads and fixtures.

The Ettco-Emrick system of multiple spindle heads cuts drilling and tapping time to a minimum. And one of the big features of the system is the ease with which it can be converted over to either drilling or tapping. The changeover takes only a few minutes — and requires no special tools or skill.

This *interchangeability*—plus the fact that all Ettco-Emrick head-and-fixture units are made of standardized parts—can be *used on any drill press*—and *maintain top output with unskilled labor*—make the Ettco-Emrick system the low-cost way to drill or tap small parts.



Fixed spindle heads and fixtures.

Ask your Ettco-Emrick distributor or write us for Bulletins No. 3 and 35.

ETTCO TOOL CO., INC.

598 Johnson Ave., Brooklyn 37, N. Y.

Ettco-Emrick for drilling and tapping equipment at it's best!

Thor

ANNOUNCES A NEW

AIR IMPACT WRENCH

With Exclusive Rolling Ball Type Cam!



Spectacular results in field tests conducted during the past year have fulfilled all performance promises of Thor's "rolling ball" — an exclusive new cam design incorporated in Thor 3/8" Air Impact Wrenches now being delivered to the trade.

The new cam design permits drawing threaded fasteners down faster and tighter BEFORE IMPACTING,—the operation is speeded and fewer impact blows are required for final tightening.

Coupled with a large overload capacity, the new type wrenches are only moderately stressed in performing work within their rated capacity, resulting in greatly increased normal working life.

ILLUSTRATED ABOVE — Thor "No. 24" Air Impact Wrench, 3/8" Bolt Size Capacity.

For Details or Demonstration Write

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AURORA, ILLINOIS

Branches in 20 Principal Cities

Thor TOOLS

ELECTRIC • PNEUMATIC

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE, tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. Although we tooled one of our machines to make 15 identical bends simultaneously, we rarely recommend bending more than 5 at a time due to the law of diminishing returns.



Redesigned and greatly improved, the Model A-5 still sells for only $1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

Write for detailed and descriptive folder.

PEDRICK TOOL & MACHIINE CO.
3640 N. Lawrence St. Dept. 5,
Philadelphia 40, Pa., U.S.A.



Jigs and Fixtures that are easier to handle increase production. Alcoa Cast Aluminum Tool and Jig Plate is lighter...easier to machine. And is available for immediate delivery*

- ▶ Moderately Priced. About $4.00/square foot
- ▶ Easy to Machine
- ▶ Normalized...Strain Relieved
- ▶ Tolerances on Plates of thicknesses from 1/2" to 4", held within ±.010"
- ▶ Widths and lengths: cut to any desired dimensions up to 48" x 96"

**For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office . . . or Aluminum Company of America, 1950-E Gulf Bldg., Pittsburgh, Pa.*

ALCOA ALCOA ALUMINUM

TOOL AND JIG PLATE

INCREASE PRODUCTION with Commander PRODUCTION TOOLS

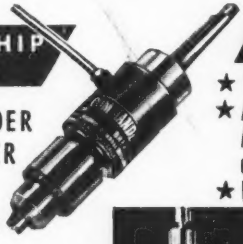


Adjustable MULTI-DRILL

★ DRILLS UP TO 8 HOLES AT 1 STROKE
★ ADJUSTABLE TO *ANY* HOLE PATTERN
★ FITS *ANY* DRILL PRESS

You can drill 2 to 8 holes at one stroke of a MULTI-DRILL equipped drill press. Instantly and easily adjusted to any hole pattern . . . compact in design and ruggedly built for years of service, thousands of MULTI-DRILLS are cutting costs and increasing output up to 800% wherever metal, wood or plastics are drilled.

New DRILL CHIP BREAKER



Get these COMMANDER DRILL CHIP BREAKER benefits now:

- **Faster Drilling**
- **Deeper Holes**
- **Better Holes**
- **Longer Drill Life**
- **Safer, Cleaner Work**
- **REDUCED DRILLING COSTS**

Write for illustrated Circulars on Commander Production Tools. Your nearby Commander Distributor carries the full line—write for his name.



ORDINARY CHIPS



CHIP BREAKER CHIPS

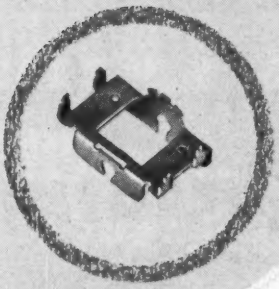
COMMANDER TAPPER

★ 1 Tapper Handles Taps #0 to ¾"
★ Automatically Sensitive... Any Operator Can Do Precision Tapping
★ Fits ANY Drill Press



Commander Tappers "think for the operator"—automatically stop when taps are dull, overloaded, or when they strike bottom in blind hole tapping—permit faster tapping, better work, even with inexperienced operators. Torque control provides positive tap protection from #0 to ¾"...spring clutch eliminates slippage, assures smooth, quiet, easy operation.

Commander MANUFACTURING CO.
4224 W. KINZIE ST. • CHICAGO 24, ILL.



interchangeable punches

. . . made it possible for one die to do the work of three in stamping this switch bracket for use in a 2, 3 or 4 position rotary slide switch. But the interchangeable punches made extra precise die work and accurate closure a must. That's why . . .

they built the die in a

DANLY PRECISION DIE SET

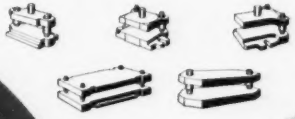
DANLY®

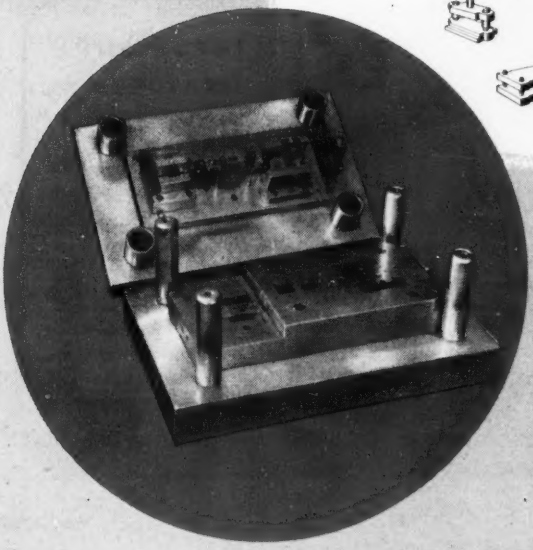
Reliable Danly precision makes every Danly Die Set the finest base for exacting die work. Square and true, they save time in the die shop and assure longer production runs in the press.

That's why diemakers everywhere prefer Danly Die Sets. They're quickly available from a nation-wide system of stocked assembly branches†... just phone for fast delivery.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue Chicago 50, Illinois

PRECISION DIE SETS... STANDARD AND SPECIAL





WHICH DANLY BRANCH IS CLOSEST TO YOU?

***CHICAGO** 50, 2100 South Laramie Avenue
***CLEVELAND** 14, 1550 East 33rd Street
***DAYTON** 7, 3196 Delphos Avenue
***DETROIT** 16, 1549 Temple Avenue
***GRAND RAPIDS**, 113 Michigan Street N.W.
INDIANAPOLIS 4, 5 West 10th Street.
***LONG ISLAND CITY** 1, 47-28 37th Street
***LOS ANGELES** 54, Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2, 111 East Wisconsin Avenue
***PHILADELPHIA** 40, 511 W. Courtland St.
***ROCHESTER** 4, 16 Commercial St.

*Indicates complete stock

HYDRATROL LATHES

LARGE HOLLOW SPINDLE TYPE



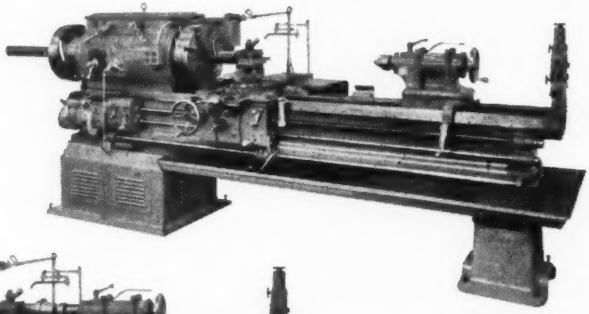
Check These 3 Points of... versatility

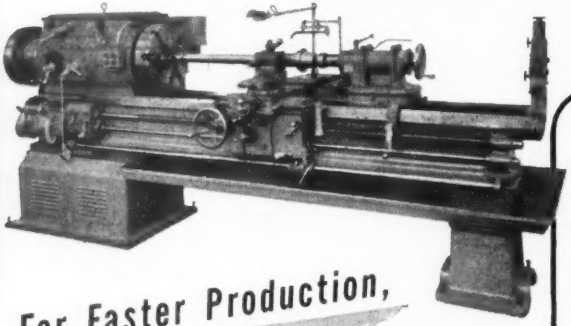
1. Machine long work chucked through spindle.
2. Machine work between centers.
3. Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

Both Illustrations Show the 18" Hollow Spindle 7⅛" Hole

SIZES 18" TO 36"

Small – 18" & 20" up to 7⅛" Hole
Medium – 25" up to 12" Hole
Large – 32" & 36" up to 16⅛" Hole
(Standard Type Lathes 16"-36")





IMPORTANT FEATURES

Timken Bearing Spindles.

Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

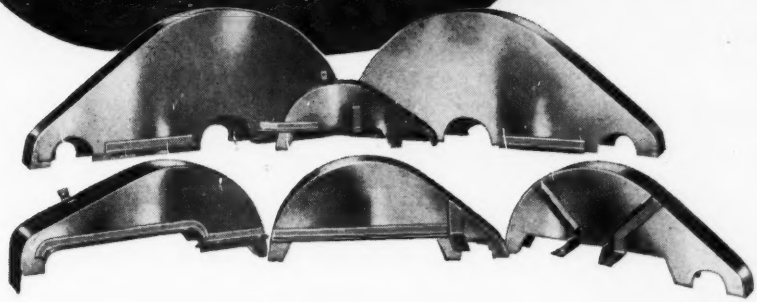
For Faster Production, Better Work, Lower Costs!

LEHMANN MACHINE COMPANY

CHOUTEAU AT GRAND • SAINT LOUIS 3, MISSOURI

SHEET & PLATE FABRICATION by KIRK AND BLUM

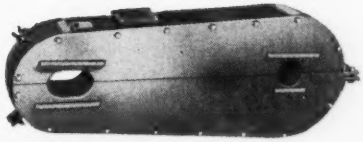
Belt and Gear Guards

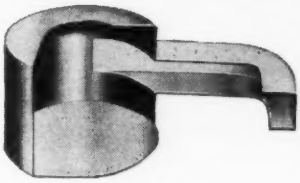


If you need welded steel belt or gear guards, bases, pans, pedestals, frames or other fabricated items for your production, call on Kirk & Blum. Complete facilities to ½" capacity for all types of fabrication.

Whether it's 1, 100 or 1000 units, Kirk & Blum can produce them promptly and economically.

Modern equipment, in a new, large plant, together with a skilled organization with 45 years' experience assures you of complete satisfaction. For a prompt quotation, send prints to **The Kirk & Blum Mfg. Co., 3203 Forrer Street, Cincinnati 9, Ohio.**

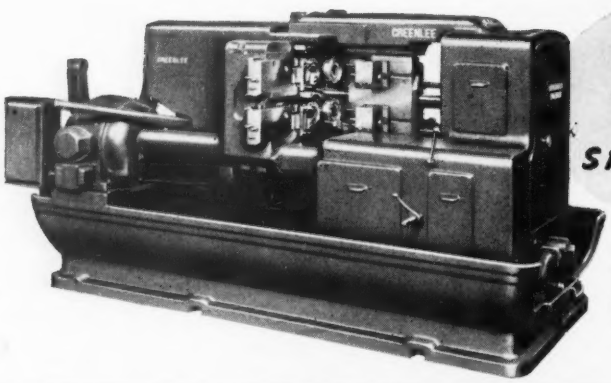




Drive Guards • Louvre Panels
Cover Plates • Drip Pans • Lathe Pans
Brackets and Supports • Tanks

KIRK AND BLUM

METAL FABRICATION



4 SPINDLE

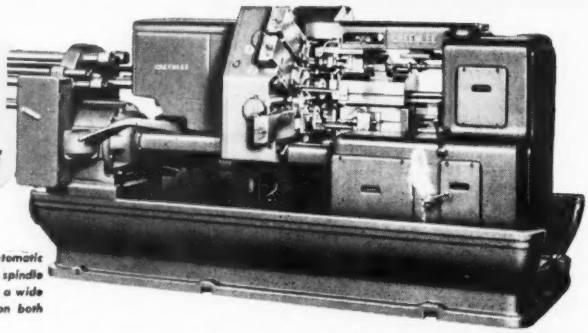
THE GREENLEE "FOUR"

A heavy-duty automatic made in 1⅝" and 2⅛" spindle capacities. The "Four" incorporates all the cost-cutting features of the well-known "Six" (see below).

GREENLEE

AUTOMATIC SCREW MACHINES

6 SPINDLE



THE GREENLEE "SIX"

A ruggedly-built, high-speed automatic . . . available in 1", 1¼", and 2" spindle capacities . . . capable of handling a wide range of work . . . widely used on both short and long-run jobs.

OUTSTANDING FEATURES OF ALL GREENLEE AUTOMATICS

Write for literature describing in detail all the features of Greenlee Automatics.

PRODUCTION MACHINERY
GREENLEE

UNIVERSAL TOOLING — Tool holders fit any cross-slide cavity . . . are easily and quickly changed . . . reduce equipment costs.

INTERCHANGEABLE CAMS — Can be changed at will without re-adjustment of tools and holders. Cam storage is held to a minimum . . . cam costs greatly reduced.

BUILT-IN THREADING DRIVE AND FEED — Not an extra attachment, but standard equipment on Greenlee Automatics.

BUILT-IN COOLANT SYSTEM — Eliminates cumbersome piping in tooling area . . . gets coolant right where it does the most good.

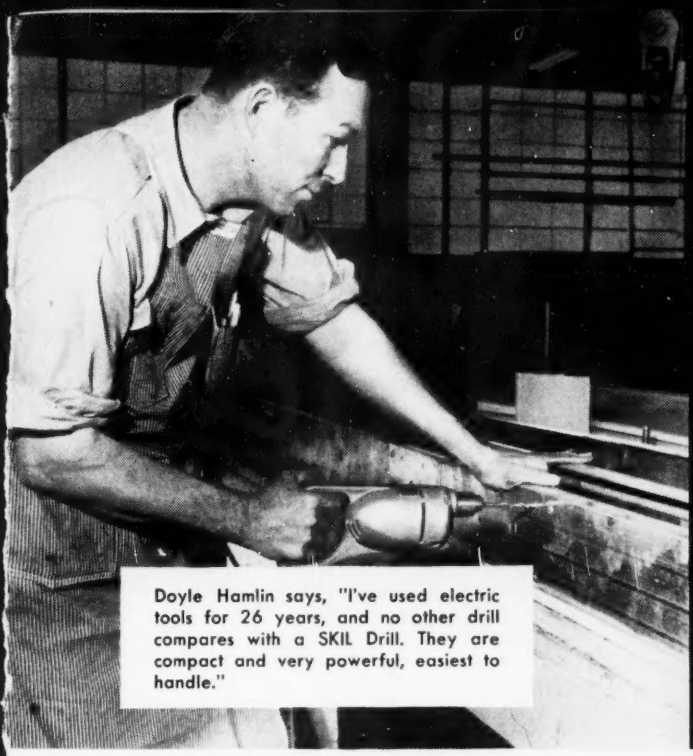
LARGE TOOLING AREA — Permits using many timesaving, cost-cutting auxiliaries that often eliminate second operations.

Various special adaptions of standard Greenlee Automatics can be made . . . for handling second-operation work . . . for tooling extra-long work pieces . . . for multiple feed-out arrangements, etc.

Send us details of your work. Let our engineers show you how profitably Greenlee Automatics can be applied to your production.

GREENLEE BROS. & CO., 1885 Mason Ave., Rockford, Ill.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING, MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



Doyle Hamlin says, "I've used electric tools for 26 years, and no other drill compares with a SKIL Drill. They are compact and very powerful, easiest to handle."



SKIL Shear

Another 20 Year User Praises SKIL Tools



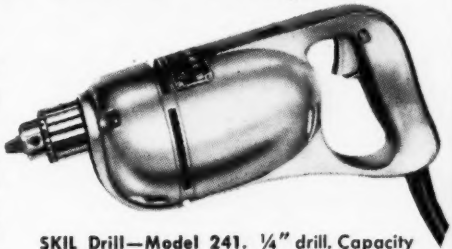
SKIL Driver

SKIL Belt Sander

"SKIL Portable Tools are the most dependable in our shop!"

—says **Sidney Zimmerman,** Gen. Supt., **J. F. Zimmerman & Sons,** Dallas, Texas

This maker of neon signs gives unqualified approval of SKIL performance under all working conditions. He says, "SKIL tools have made a big contribution to production in our shop. We give them real punishment, and they keep right on giving back the kind of performance that built the SKIL reputation. And I *say* this based on our long experience with these tools!"



SKIL Drill—Model 241. ¼" drill. Capacity in steel: 0" to ¼"; in hardwood: 0" to ½". Speed: 2250 r.p.m. no-load. Over-all length: 11¼". Weight: 4¾ pounds.

See your distributor for complete information or call your nearest SKILSAW factory branch

SKIL

SKIL products are made only by SKILSAW, INC. 5033 Elston Avenue, Chicago 30, Ill.

•

SKILSAW Factory Branches In 34 Principal Cities In Canada: Skiltools, Ltd. 3601 Dundas Street West, Toronto 9, Ont.

CONVERTICAL
QUILL TRAVEL MILL ATTACHMENT



$245.00 COMPLETE WITH MOTOR FOB Chicago

High speed, medium and light operation made for Bench, Floor and Pedestal Mills.

New!

PRECISION MADE BY

RUSNOK

ONLY LOW COST QUILL TRAVEL ATTACHMENT

MILLING DRILLING BORING

- Quill travel 1½"
- Five spindle speeds 380, 700, 1200, 2500, 5200 RPM
- Micrometer depth stop
- Positive Quill lock
- Forward, stop, reverse control
- Angular settings, single and compound
- Full use of table travel
- Time-saving settings
- Quick, easy speed change
- Light, efficient rigid

WRITE TO TOOL WORKS

RUSNOK

FOR BULLETIN C

4840 W. North Ave. Chicago 39, Illinois

BE *Sure* YOUR NEW ENGINE LATHE CAN *Take* IT!

The engine lathe you buy today could be the one you will call upon for 'round-the-clock production. Make sure, before you buy, that the lathe of your choice can take such punishment.

ASK ONE QUESTION!

What is the headstock gear arrangement?

MAKE SURE OF THREE POINTS

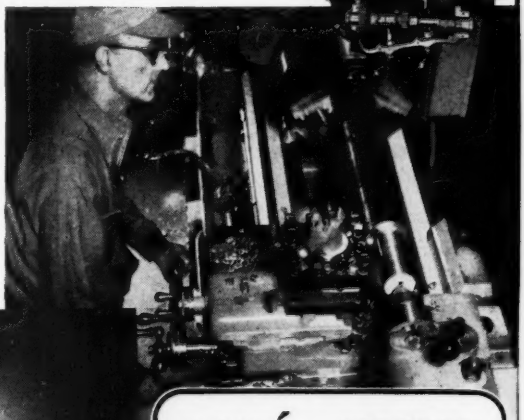
(1) That all gears are arranged in a horizontal plane, easy of access.
(2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches, eliminating gear wear due to shifting action.
(3) **That the "back gear" is in *front* of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.**

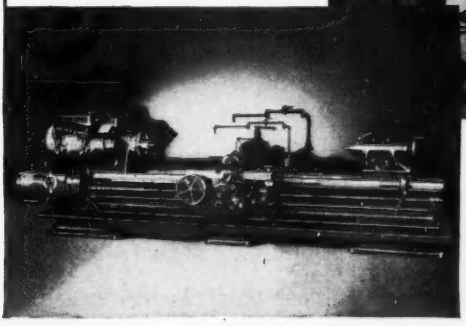
On these three points long life for engine lathes depends. At these three points Boye & Emmes Long Life, Heavy Duty Engine Lathes excel.

GET THE FACTS

Write for our free Bulletin No. 603 today and count the B & E exclusives. Tomorrow you may need the information.

"Back-gear-in-front" guards spindle bearings during heavy cuts.



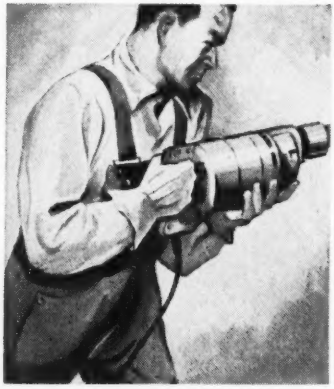


BOYÉ & EMMES
MACHINE TOOL COMPANY
123 CALDWELL DRIVE
CINCINNATI 16, OHIO

Why Flexible Shaft Driven Tools Are Easier To Handle...



You Get This
where you have only the tool to handle.



Instead Of This
where you have both the motor and the tool to handle.

Just compare the illustrations above. It's easy to see why the flexible shaft driven tool (at the left) is easier to manipulate. The operator has less weight and bulk to carry. As a result, he can handle the tool more readily and with much less effort. That's why you'll do well to consider the advantages of an S.S.White flexible shaft drive when designing portable tools. For further details

SEND FOR THIS 256-PAGE FLEXIBLE SHAFT HANDBOOK

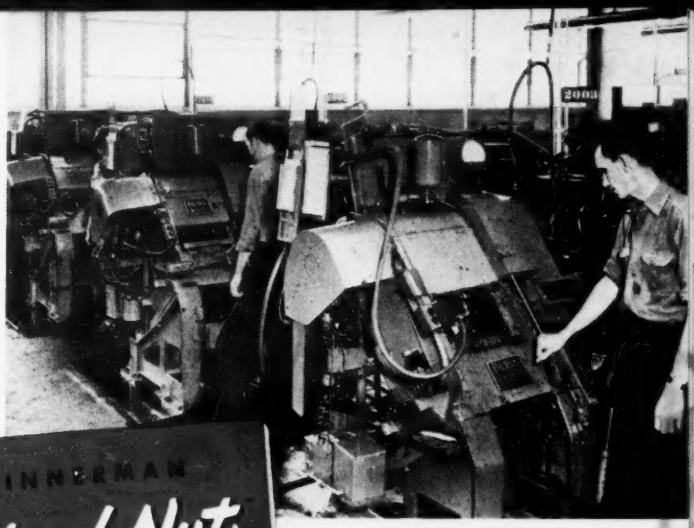
Complete, authoritative information on flexible shafts sent free if you write for it on your business letterhead.



THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

Dept. 5, 10 East 40th St.
NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California



Behind



stand these Bliss Presses

When it came to high-volume, low-cost production of its famous Speed Nuts, Tinnerman Products, Inc., turned to Bliss High Production presses. That is because Bliss HP presses provide definite operating advantages, especially on high-speed, progressive die operations.

Here's how the Bliss design cuts vibration and deflection to a minimum; maintains high output and long die life:

- Crankshaft with oversize crankpins supported in heavy box-type crown
- Frame of high-tensile, fine-grained Meehanite with heavy sections minimizing deflection
- Slide guided in bronze-lined square gibs throughout entire stroke and adjustment. Gibs are aligned to extremely close tolerances for very accurate slide guidance
- Rolls and feed adjustments built-in for precision feeding
- Compact design for high-speed operation
- Die area easily accessible from both front and rear of press for ease in setting complicated multiple-station dies.

If your metal stampings involve high-volume production and or progressive die operations—you will find it worth your while to investigate Bliss HP presses. Let a Bliss sales engineer tell you about the large range of sizes, the full significance of these design features. Write for catalog.

E. W. BLISS COMPANY, CANTON, OHIO

E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France
Presses, Rolling Mills, Special Machinery

"One or Several Copies Are Needed in Any Shop Doing Stamping Work"... *American Machinist*

Completely New



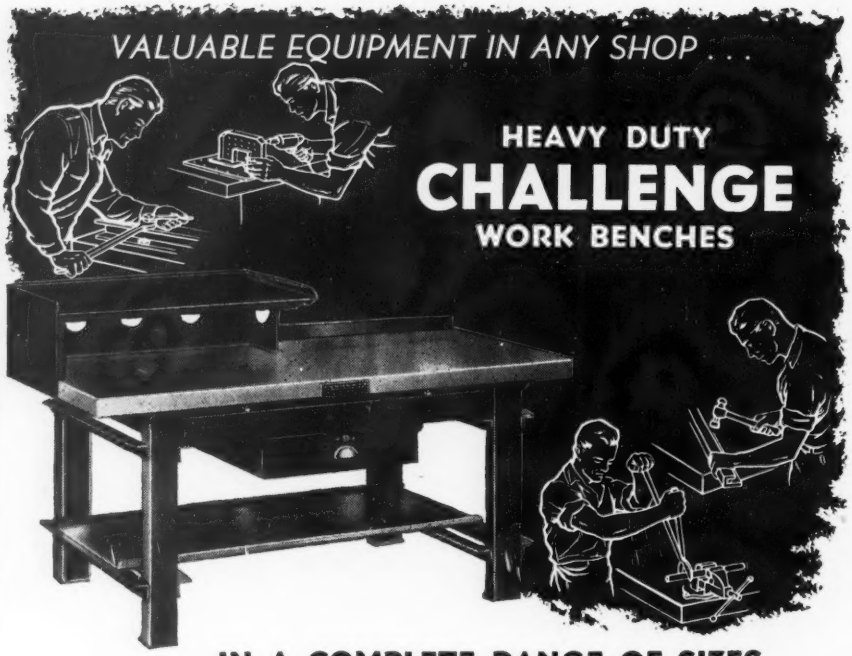
700 Pages • 450 Illustrations

Sections on: Computing press jobs • Selecting proper press • Useful engineering tables • Die illustrations • Complete glossary. Plus a service section for Bliss presses. **$7.50**

E. W. BLISS COMPANY—Handbook Dept., Canton, Ohio

From a single press for a given job... to a complete press room... **It's Bliss!**

VALUABLE EQUIPMENT IN ANY SHOP . . .



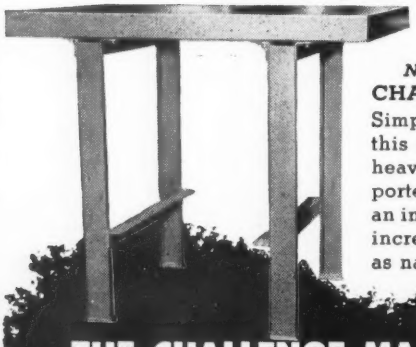
HEAVY DUTY

CHALLENGE

WORK BENCHES

IN A COMPLETE RANGE OF SIZES

These strong, rugged . . . and accurate-top work benches have no equal when it comes to providing facilities for work-handling. Each bench comes complete with tool box shelf . . . lock-leveling screws . . . guard rail . . . roomy steel drawer with lock . . . and a convenient storage shelf. Cast-iron top 2" thick.



NEW! LOW-COST

CHALLENGE UTILITY BENCH

Simple in design . . . rugged in construction, this plain Utility Bench has many uses! It's heavily ribbed, 24x36" cast-iron top . . . supported by sturdily braced steel legs . . . provides an inexpensive working surface. No "frills" to increase price. Size: 36" high . . . or 30" high as nailing table. Write for details. 707

THE CHALLENGE MACHINERY COMPANY

Office, Factories and Show Room: Grand Haven, Michigan

Challenge TRADE-MARK ®

TRADE MARK
"FULFLO"
REG U S PAT OFF

OIL BY-PASS RELIEF VALVES

NEED NO MAINTENANCE

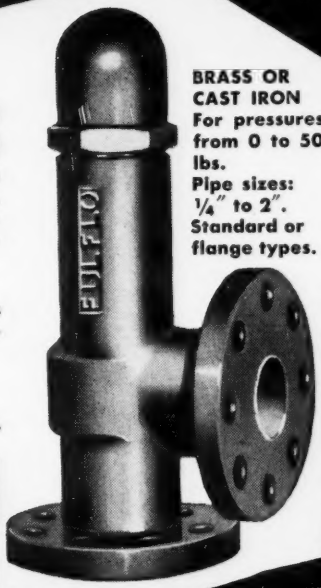
Precision-engineered to maintain pre-determined pressures on . . . ram presses, machine tool hydraulic mechanisms, Diesel and oil-burning equipment.

Trouble-free because with fewest parts engineered for dependable, quiet, constant performance.

NON-CHATTERING . . . no pounding noise.

TODAY... write for your personal, professional edition (use letterhead, please) of FULFLO MECHANICAL DATA BOOK.





BRASS OR CAST IRON
For pressures from 0 to 500 lbs.
Pipe sizes: ¼" to 2". Standard or flange types.

"FULFLO"

THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

CAN YOUR SURFACE

Will they take the EXACT depth of cut for which you set the Down-Feed Handwheel ?



HERE'S a way to put a grinder through its paces—to find out if its got what it takes! Handwheel graduations in ten-thousandths don't mean a thing unless the wheel will obey the setting.

DoALL Precision Hydraulic Surface Grinders will take a cut that is right on the nose because they are rigid and rugged and machined to exacting perfection. The vertical column is 30 inches long to reduce misalignment to microscopic proportion. There is an automatic take-up on the spindle bearings to compensate for wear and temperature change. The frame is massive with a single-piece column support and base. The husky spindle support is dowelled and bolted to the column.

You have to see a DoALL Grinder perform to believe it—see it take .010" cuts with .010" crossfeed in high chrome, high carbon steel true to the down-feed setting in one pass.

Let your local DoALL Sales-Service store demonstrate a DoALL Grinder right in your own plant. There is no obligation.

THE DoALL COMPANY

254 N. Laurel Ave.
Des Plaines, Illinois



Ask For Grinder Catalog

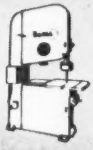
. . . complete information on the complete line of DoALL Grinders for toolroom and production work.

CALL DoALL FOR:

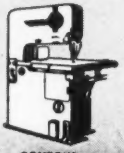




CONTOUR-MATIC



ZEPHYR



CONTOUR



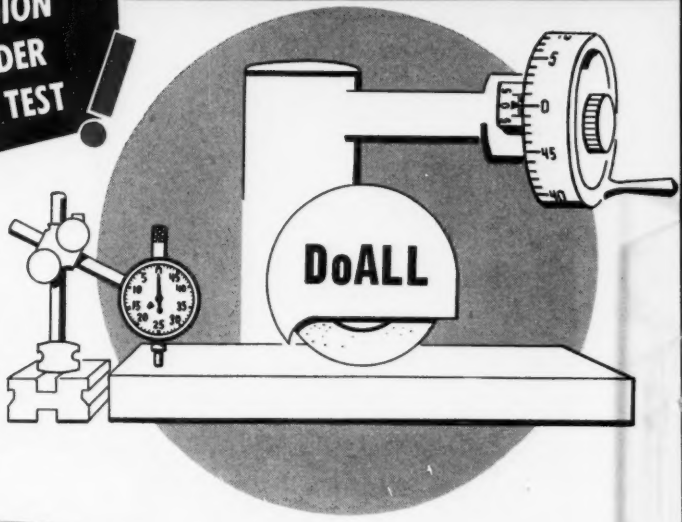
BAND



SAW

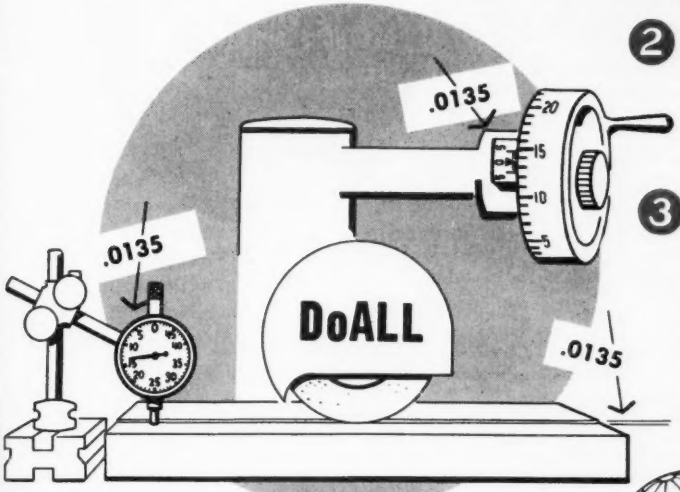
GRINDERS DO THIS?

A DoALL PRECISION SURFACE GRINDER WILL PASS THIS TEST



1 **SET THE HANDWHEEL** to remove .0135" of stock. Position a dial test indicator at zero reading on the work surface.

2 **GRIND THE PIECE.**

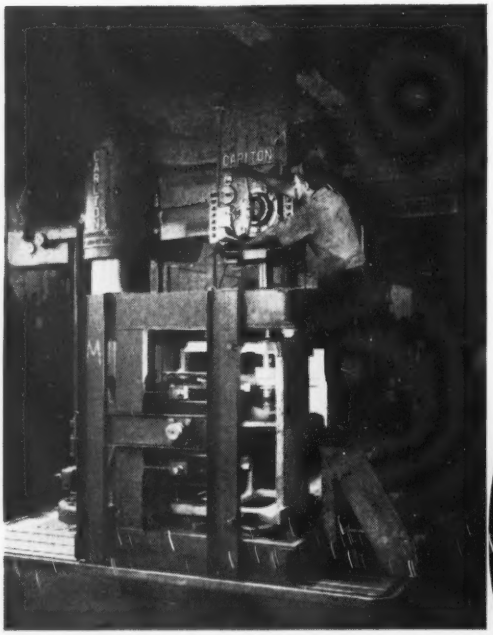


3 **CHECK THE MATERIAL** to see if exactly .0135" has been removed. If you did the job with a DoALL Grinder the dial indicator will now show the work surface exactly .0135" lower than before grinding.

DoALL

GR-75





Carlton customers

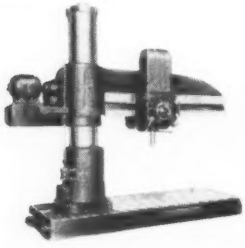
GET HOLE DRILLING EFFICIENCY AND ECONOMY!

CARLTON RADIAL DRILLS provide generous capacity and tremendous power, yet are extremely accurate. Miller Printing Machinery Co., Pittsburgh, says:

"When compared to the ordinary drill, this huge Carlton radial (above) is gigantic and yet it is precise and accurate."

THAT PRECISION COMES FROM enlightened Carlton designing, engineering and manufacturing . . . and from an intimate knowledge of your radial drill requirements acquired in sixty years of experience.

Be sure to check Carlton before you buy your next radial drill. Ask for descriptive bulletins today.

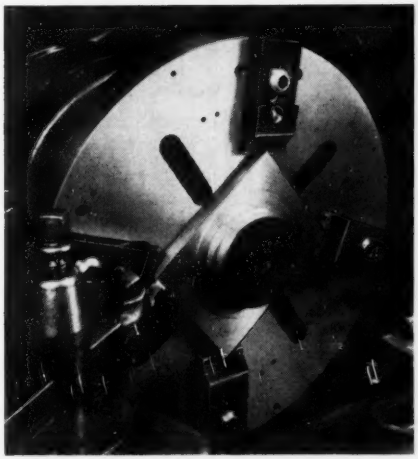


Carlton

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO, U. S. A.

PRODUCTION OUTPUT CLIMBS WITH NEW J & S JAW CLAMPS

The Clamp You Can't Afford To Be Without

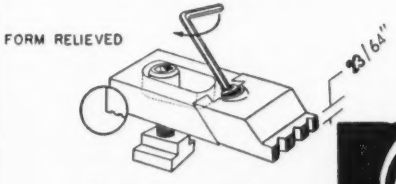


Typical lathe application. Workpiece removed by simply loosening one screw in each of two adjoining clamps. NO RE-POSITIONING NECESSARY for next piece. Standard clamp being used.

Eliminate **U-clamps, Straps and fingers on lathes, planers, milling machines, drill presses and boring millers! Also in most cases, *eliminate* 4-jaw chucks, vises and special fixtures!**

Fastest, simplest—work-pieces held rigidly. Less obstruction, *no slipping* because a 1/16" tapered slot insures firm grip. Also, angle of jaw travel is 45° to plane of the face plate or table. As the screw is tightened, the jaw forces the work-piece down against the machine surface—across against the opposite clamp—this grip is stronger than that provided by eight U-clamps! Allows overall machining to within 3/8" of the machine's working surface! Available in types and sizes to suit all applications. "T" nuts furnished to fit all standard machines.

DELIVERY FROM STOCK! ***WRITE FOR NEW FOLDER!***



PAT. PEND.

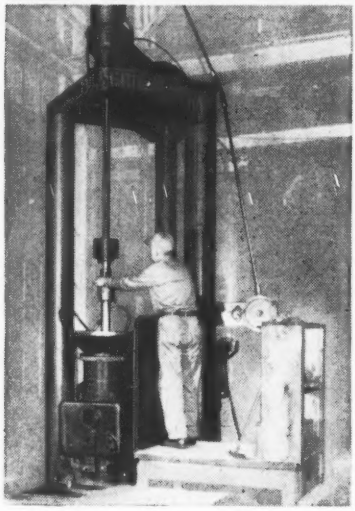
—contains complete details on advantages, applications, types and sizes available. Booklet describing J & S "Fluidmotion" Wheel Dressers, etc., also sent on request.

J&S TOOL CO., INC.
475 Main St., East Orange, N. J.
Representatives in Principal Cities

CUT AWAY FERROUS & NON-FERROUS METALS QUICKLY AND CHEAPLY WITH

FULMER HONING MACHINES

Hone as much as 1/16 inch of material at 1½ to 2 cu. in. per min.

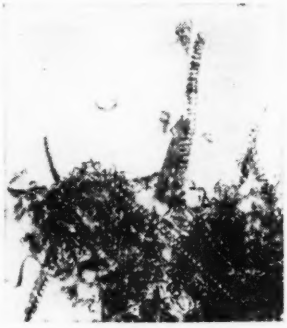


FULMER Honing Machines generate true internal cylinders from ½" up to 30" diameter. Hones are self-aligning and remove rough surfaces by *cutting away* material to tolerances of .0001 plus or minus on size, straightness and roundness.

CHIPS CAN BE AMAZINGLY LARGE—

AS LONG AS 6 INCHES.

For internal cylinders of metal, plastic or glass.



FREE . . . WRITE NOW
Illustrated, technical manual: "What to Know about Honing."

Illustrated by "live photo" is Continental Gin Co., Birmingham, Ala., honing Diesel cylinders.

Fulmer . . . and only Fulmer offers complete honing equipment in "one package"
Machines . . . Hones . . . Stones . . . Fixtures . . . Tools

C. ALLEN FULMER CO.

1233 FIRST NATIONAL BANK BLDG. • CINCINNATI 2, OHIO

"Standardized on NORGREN for years... Extremely Satisfactory"

NATIONAL ELECTRIC WELDING MACHINES CO.

PLANT REPORT

PROBLEM:

To find standard lubricating, air pressure regulating, and air line filtering equipment which would be readily available in sizes and types for easy make up into various assemblies for a wide range of specially designed production-line resistance welders.

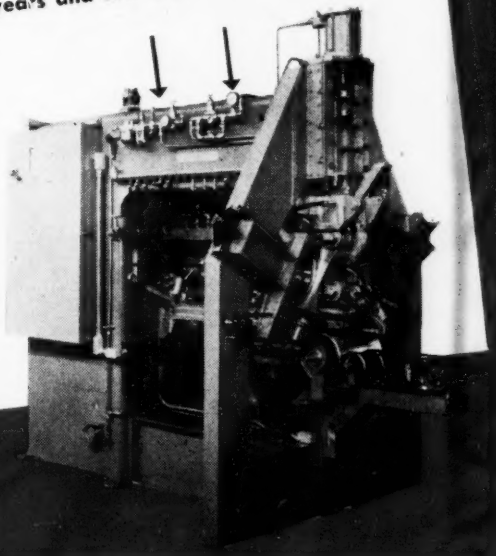
SOLUTION:

Use of Norgren Lubricators, Regulators, and Filters.

RESULTS:

"National Electric Welding Machines Company has standardized on Norgren air accessories for years and has found them to be extremely satisfactory.

This special 200 KVA Seam Welder automatically roll-forms, sizes, feeds and mash-seam-welds metal containers from 15" to 25" dia. and 10" to 30" long. This is a typical National Electric Welding Machine Company product, using Norgren lubricators, air line filters and air pressure regulators. Primary air pressure ranges from 80 to 100 psi; secondary from 60 to 80 psi.





- VALVES
- FILTERS
- REGULATORS
- LUBRICATORS
- HOSE ASSEMBLIES

Norgren

3435 S. ELATI ST., ENGLEWOOD, Suburb of Denver
IN COLORFUL COLORADO

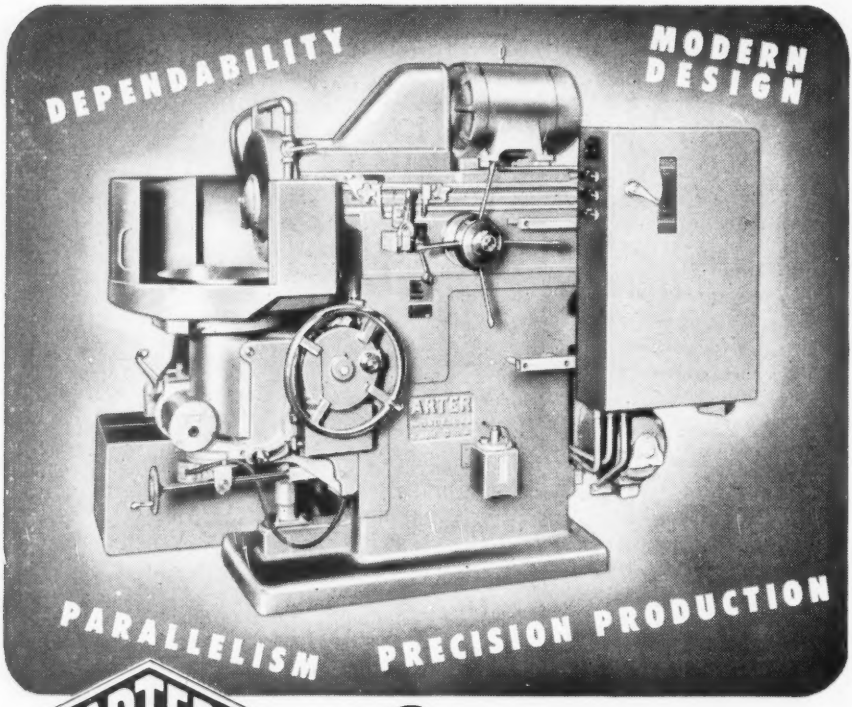
C. A. NORGREN CO.
3435 So. Elati—Englewood, Colorado

Gentlemen: Please send me your free Norgren Blueprint No. 115, giving complete data on above lubrication system.

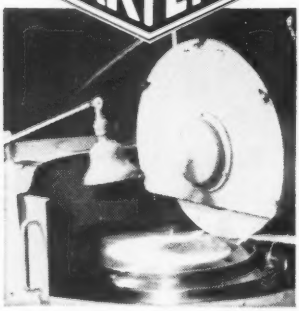
NAME_____

ADDRESS_____

COMPANY_____



ARTER



Rotary SURFACE GRINDERS

Model D • 12" and 16"

Arter has been building Rotary Surface Grinders for more than thirty years. The Model D machines are an intermediate series, 12" and 16" in diametrical capacity. They are modern in design, dependable and built to give years of satisfactory service to all users of this type of precision grinder.

Write today for complete details and specifications.

Arter GRINDING MACHINE CO.

WORCESTER 5, MASSACHUSETTS

famco



1 ARBOR PRESSES, 32 stock plain lever, simple ratchet, combination compound and simple ratchet models; bench and floor types. Deliver up to 15 tons pressure.

2 SQUARING SHEARS, 8 models, power and foot operated. Cutting widths 22" to 52". Ruggedly built; capacity to 18 gauge mild steel.

3 FOOT PRESSES, 10 bench and floor-type models; sturdy semi-steel construction, accurately machined. Deliver to 3¾ tons pressure.

4 AIR PRESSES, 20 models, ½ to 3½-ton capacity with electric or air controls. Compact, rugged; designed and built for heavy, continuous industrial application.

5 DRILL PRESSES, 28 models of 15" presses in single and multiple spindle models, bench and floor types. Offers exclusive Famco features.

6 BAND SAWS, 4 models of horizontal metal cut-off saws, dry and wet cutting types. Cut all shapes and types of metals. Capacity: 6" round and 6"x12" rectangular stock. Many design improvements.

7 POWER PRESSES, 12 open-back, inclinable standard and deep-throat production models, bench and floor types. Offers most models, highest quality in small presses.

FAMCO MACHINE COMPANY

SALES DEPT. 1324 18th STREET • RACINE, WISCONSIN



UNION TWIST DRILLS are made in the broadest range of types, to cover every drilling operation — no matter what your material or drilling equipment may be.

For fast, free-cutting performance, minimum breakage and more work between re-sharpenings, see your Union Distributor for the drills that are *right* for *you*



FIRST TEAM IN CUTTING TOOLS . . .

UNION *and your Local Distributor*

Welcome to our booths 341, 339 and 337 at the Triple Industrial Supply Convention.

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS • Milling Cutters • Gear Cutters • Twist Drills • Hobs • Reamers • Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass., Taps, Dies, Screw Plates . . .
BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers, Twist Drills . . .
BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates

2 Duplicators in 1

with TWIN SPINDLES ..a GORTON Tracer-Control Development



Now engineers can plan ahead for stepped-up production with the duplicator they specify today!

A Tip to Increase Defense Production

Two sets of multiple blades duplicated simultaneously from single master blade on Gorton 9-J.

You'll find Gorton Twin-Spindle Duplicators ideal for long production runs of profiling or die and mold cutting operations—both roughing and finishing, in two or three dimensions.

If your present production schedule doesn't warrant twin-spindle operations, install a conventional Gorton Duplicator now. Whenever you feel the need, you can easily change to the twin-spindle head and ram assembly—cost of conversion only 22% of complete single-spindle machine. This doubles the ability of your duplicator to turn out work.

Whether you need a conventional or twin-spindle duplicator, Gorton's general catalog contains important information for you. Write for it.

JOB FACTS

Gorton Super-Speed 9-J Duplicator with twin-spindle head assembly and rotary tables, equipped with two high-speed, 4-flute spiral cutters turning at 980 rpm for both roughing and finishing, profiled from the solid 20 impeller blades 9/16" high by 2" long. Cutting time: 4½ hours. BONUS: One *extra* identical work piece finished completely from one simple master of one blade.



Please send at once complete information about the Gorton line contained in Bulletin 1655-1705.

Firm .....

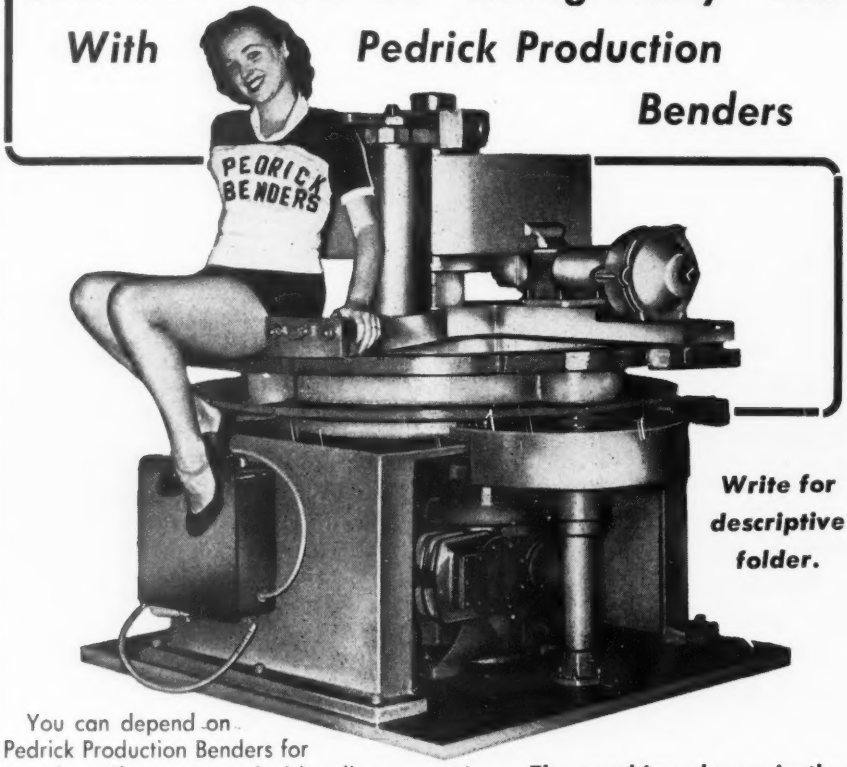
Name .....

Title .....

Address .....

City, State .....

And . . . You'll be "Sitting Pretty" Too With Pedrick Production Benders



Write for descriptive folder.

You can depend on Pedrick Production Benders for speedy, uniform, economical bending of pipes—tubes—strips—shapes and bars.

They are proving their efficiency and economy, right on the production line every day. Rely on Pedrick Benders for speed, accuracy and versatility.

Equipped with relay controls, for semi-automatic duplicate bending—they handle pipe up to 6" extra heavy—have no clamps — require no special skills — eliminate the cost of expensive tools.

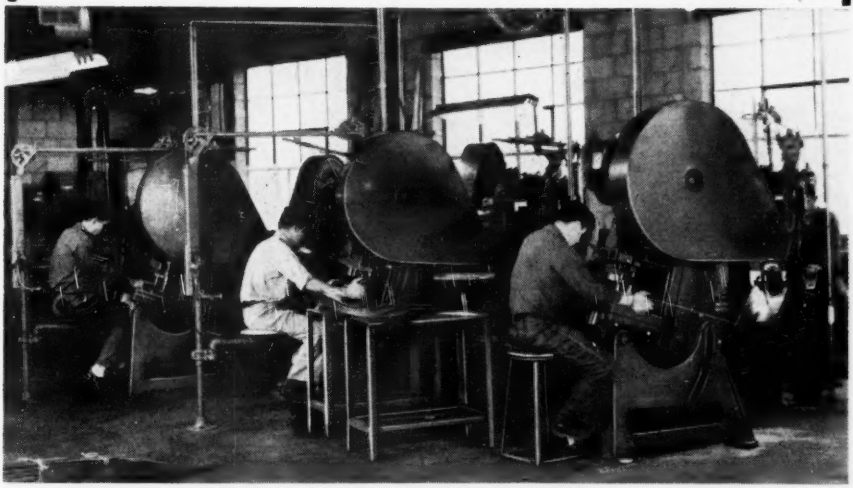
The machine shown in the illustration is bending aluminum alloy bar stock 10" wide and 1½" thick. The bend must be made to a very close tolerance both as to radius and curvature. This is one of two machines sold to this customer.

PEDRICK TOOL AND MACHINE CO.

3640 N. LAWRENCE STREET DEPT. 5 PHILADELPHIA 40, PA.

PRESS-RITE — POWER PRESSES

ASSEMBLY ▼ PIERCING ▼ EXTRUDING ▼



▲ FORMING ▲ BLANKING ▲ PIERCING, COUNTERSINKING and CUT-OFF

. . . KEEP PRODUCTION HUMMING!

Dalhart Engineering & Manufacturing Co., Inc. of Van Dyke, Michigan, banks on 30-ton Press-Rites for top speed production with low maintenance and operating costs. Says Mr. E. F. Paner, President and General Manager: "Our operations require production equipment of great versatility and high efficiency in varied applications. We're using 30-ton Press-Rites for blanking, forming, piercing, extruding and assembly and are mighty pleased with their performance. We've found Press-Rites stand up well . . . need little maintenance even under hard, continual usage. They're tops with operators, too . . . for safe and easy operation."

Find out how Press-Rites can help solve your production problems. Write for complete information, TODAY!

8 MODELS — CAPACITIES 5 TO 85 TONS

Sales Service Machine Tool Co. SSMT

PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2355 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA

ONE SOURCE

for

EVERY TYPE

of abrasive in high-speed

PORTABLE GRINDING



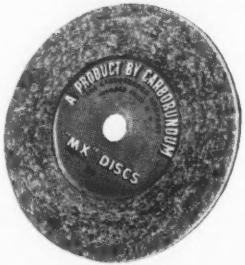
STRAIGHT WHEELS



CUP WHEELS



RUBBER-BUSHED STRAIGHT WHEELS



"MX" DISCS



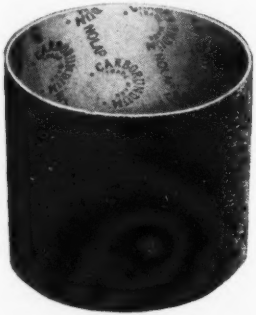
MOUNTED WHEELS



CLOTH DISCS



CARTRIDGE ROLLS



CLOTH SLEEVES

used on EVERY TYPE of portable grinding operation in metalworking

...more proof that



REDUCING WELDS
Straight Wheel



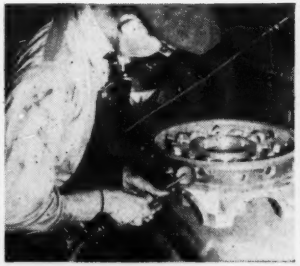
SMOOTHING EDGES
"MX" Depressed Center Wheel or Disc



ROUGH GRINDING
Rubber-Bushed Straight Wheel



ROUGH GRINDING
Cup Wheel



DEBURRING
"MX" Wheel or Cloth Disc



POLISHING AND FINISHING
Cloth Sleeve

Only CARBORUNDUM

TRADE MARK

offers ALL abrasive products...to give you the proper ONE

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

81-66

CALL **Sid Tool COMPANY** "HARD TO FIND TOOLS FOR STOCK DELIVERY"

Why Wait for SPECIAL TAPS?

we have them in STOCK for IMMEDIATE DELIVERY

HIGH SPEED | SPECIAL | RIGHT HAND TAPS



SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-24-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
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1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

- ***SPECIAL AND LEFT HAND DIES IN STOCK***

Prices on Application—We are always adding new sizes

- *Are you on our monthly mailing list? Write us today!*

NOTE: Oversize—Undersize—Acme—Metric—64th—32nd Size Taps Available for Quick Delivery.

• Are you on our monthly mailing list? Write us today!

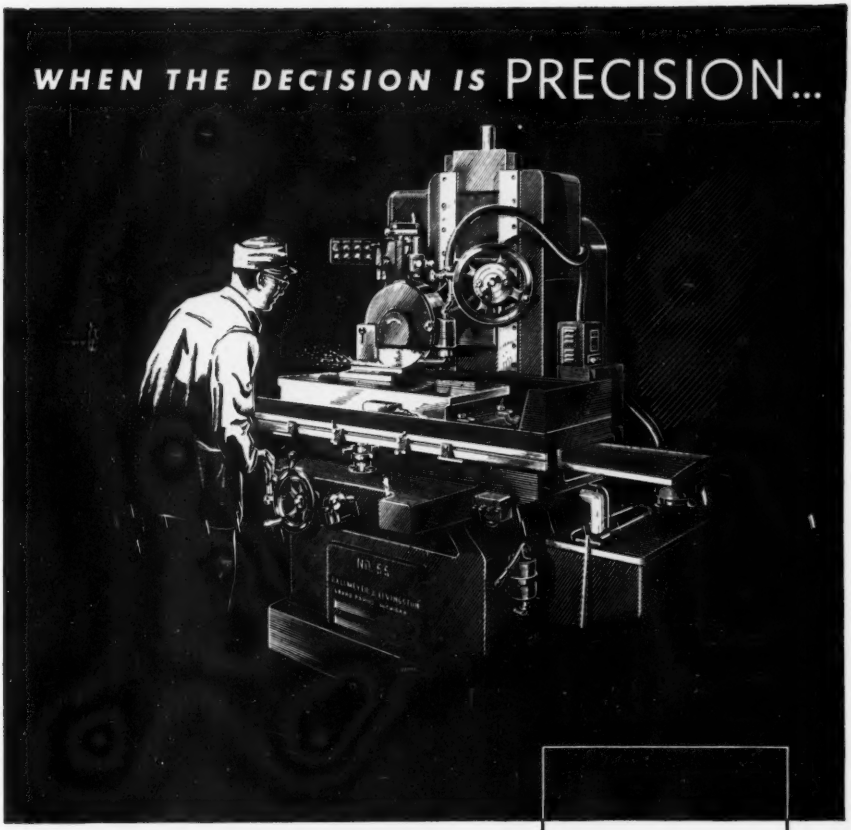
SID TOOL COMPANY, INC.

CUTTING TOOL SPECIALISTS

126 LAFAYETTE STREET • NEW YORK 13, N. Y.

PHONE: BE 3-4270

WHEN THE DECISION IS PRECISION...



Where extreme tolerances are not required, the choice of any particular grinding machine may not be too important. But, where absolute precision is demanded, the choice is usually *Grand Rapids.*

Defense orders make it impossible to fill orders as quickly as we desire—but we know our customers can appreciate the reasons for delay. As always we'll do our best to serve you.

GALLMEYER & LIVINGSTON CO.
308 Straight Ave., Grand Rapids, Mich.

Grand Rapids Grinders
—World's finest



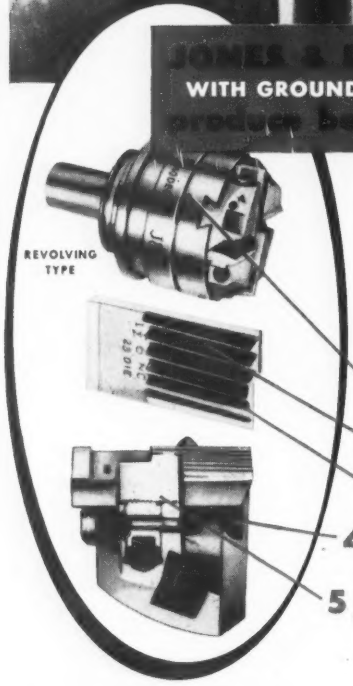
GALLMEYER & LIVINGSTON



JONES & LAMSON DIE HEADS

WITH GROUND THREAD TANGENT CHASERS

produce better threads at lower cost!



J&L Tangent Chaser Die Heads are rugged, dependable, time-tested tools. They are production engineered to produce better threads at speeds limited only by the material being threaded. Capacities are from #4 to 2".

There is a J&L Tangent Chaser Die Head engineered for your requirement. Stationary types are available for turret lathes or any machine where the tool does not turn. Revolving types are for automatic screw machines, drill presses, threading machines, or any machine where the tool is held in a live spindle.

Among the many features contributing to their ability to perform your threading job faster and better are these:

1 They are hardened and ground throughout. The chaser holding blocks are precision lapped for perfect fit into the dovetail slots in the body. Chaser cutting edges are held to a minimum distance from the die body.

2 Chasers are guaranteed to produce threads to Class #3 fit or better.

3 Exact helix angle is ground into the chasers after hardening. The result is a freer cutting tool—operating with a minimum of friction, heat and wear.

4 With a single set of chaser holders any standard thread within the rated capacity of the holders can be cut, regardless of helix angle. This eliminates the expense and trouble of constantly changing holders for different helix angles.

5 Chasers are changed and set quickly and easily, giving you more production hours each day.

Write to Department 710 for catalog on these and Radial Chaser Types and Dies for Brown & Sharpe machines.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. — DIE HEAD DIVISION

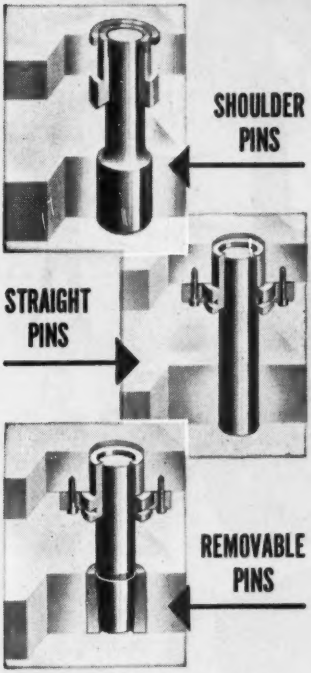
for boosting die output—

and reducing maintenance

Lamina

WATER-HARDENING STEEL

GUIDE PINS



Lamina Guide Pins give exceptional service, too. Made of water-hardening tool steel and precision lapped on the O.D., these quality pins not only wear longer but perform better. They completely eliminate the brinelling and "mushrooming" characteristic of case hardened pins when they are driven into the shoe. Note, too, the improved design of the removable pins which simplifies installation.

DISTRIBUTORS: A few desirable territories are open to qualified distributors. If interested, please write for details.

PATENT PENDING



Lamina Guide Pin Bushings are hardened steel with bronze electroplated on the inside diameter . . . it's the one bushing design that gives you the long wear life of hardened steel with complete freedom from seizing and scoring. Added to the free-running qualities of the bronze bearing surface, a double figure-eight oil groove keeps the pin and bushing properly lubricated at all times.

Lamina Guide Bushings are made in two styles illustrated above and in a number of diameters and lengths. As shown at the left they can be used with straight, shoulder and removable type pins. For longer press runs with fewer shut-downs, specify Lamina Guide Pins and Bushings.

Lamina Dies and Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.

This new brochure gives complete information and sizes on Lamina Guide Pins and Bushings. It also illustrates many other Lamina dies, tools and die-maker's equipment. Send for your copy, there is no obligation.

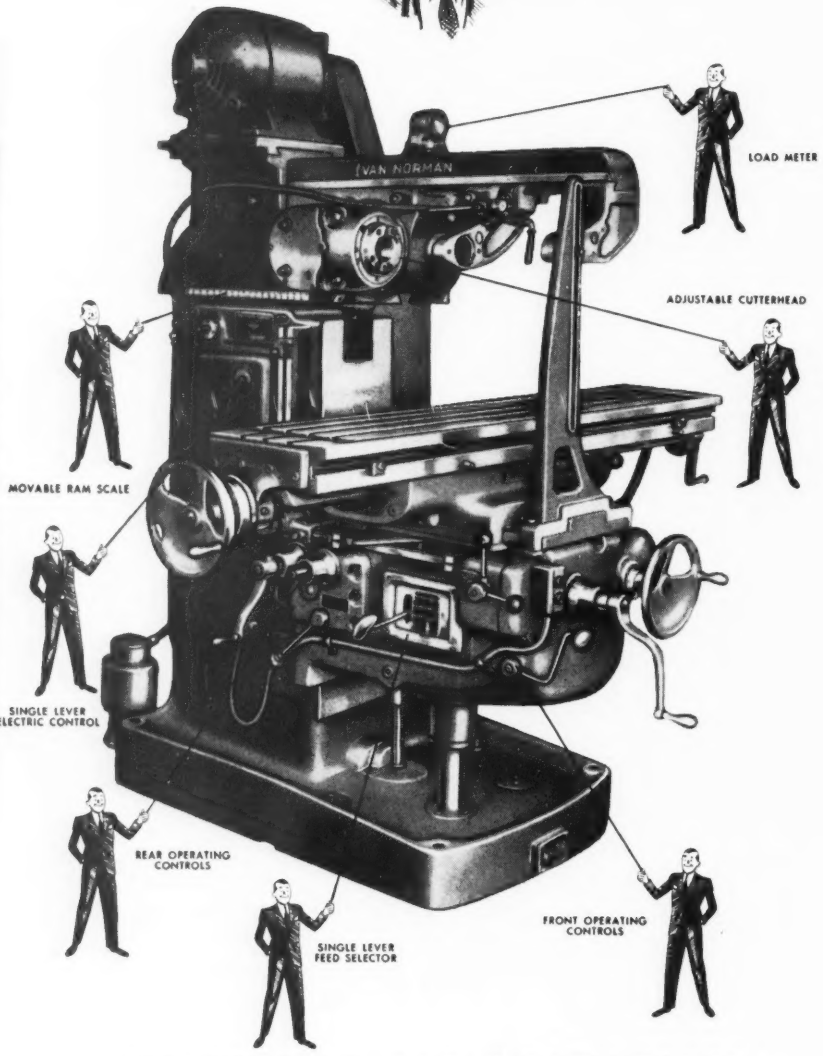


Lamina

DIES AND TOOLS



Look at the



"IT PAYS TO VAN NORMANIZE"

Production Advantages of the

VAN NORMAN

RAM TYPE MILLER

Regardless of the type of plant or the type of work, Van Norman Ram Type Millers can cut your milling costs and speed vital production. These versatile millers reduce idle machine time by as much as 50% because they enable the operator to perform conventional horizontal, vertical and angular milling on *one* machine. Look at what Van Norman Ram Type Millers can do for you —



Adjustable Cutterhead

By merely positioning the cutter head, the operator can perform horizontal, vertical or angular milling . . . the work of three single-purpose machines.



Increased Work Range

Movable ram plus the saddle crossfeed increase the work range and capacity of the miller . . . enable you to handle larger work pieces with ease.



Front and Rear Controls

Operating controls are located at front and rear for ease of operation. They eliminate back and forth operator motion . . . reduce operator fatigue.



Simplified Electric Control

Built-in electric controls simplify operation. Single lever selector controls spindle, feed, and coolant. Push button, on front of knee, starts and stops motors as pre-selected.



Load Meter

Built-in load meter indicates percent of load at which the cutter is operating. It enables the operator to operate miller at maximum efficiency . . . helps to prevent overloading of the miller motor.

Any way you look at it, the Van Norman No. 38 Ram Type Miller is your best buy for cutting costs, increasing production and accuracy.

Van Norman Ram Type Millers are available from 37" to 64" table lengths.

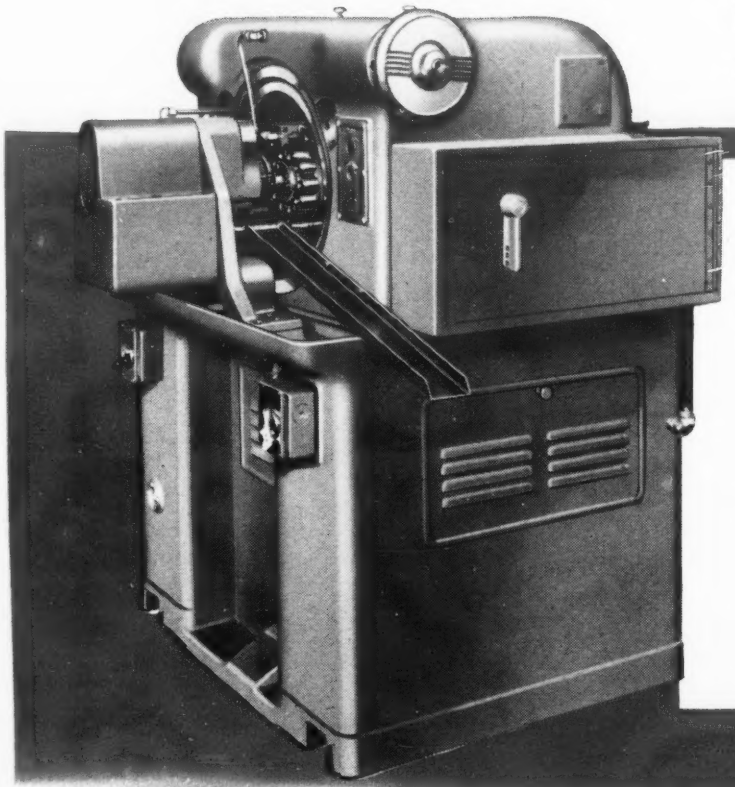
Write for complete information, today.

VAN NORMAN COMPANY

Springfield 7, Massachusetts

FOR SMOOTH THREADS...*FAST!*

you'll save materials
...and manpower



with the

NAMCO TRIPLE ROLL HYDRAULIC THREAD and FORM ROLLING MACHINE

with Magazine Feed and Hydraulic Loader

This precision high-production machine is the perfect answer for makers of instrument, aeroplane or automotive dry-seal parts for the defense program. Thread lengths greater than twice the diameter can be produced smoother, faster—and with a greater saving in materials and man-hours than by any other method.

The Namco Thread-Roller operates on either the plunge-cut or the feed-through principle, with interchangeable two-roll or three-roll heads and straightline support. Class 3 fit and unsurpassed finish (superior to ground-thread production) are characteristic.

Capacities range from $\frac{3}{8}$" up to $1\frac{1}{2}$" using three rolls—and $\frac{1}{8}$" to $\frac{3}{8}$" using two rolls. Because of its three-roll operation and three-point support, which eliminates distortion, the machine is a "natural" for hollow work.

To save additional man-hours and permit the use of unskilled labor, magazine feed and hydraulic loader are available. This combination makes the Namco Thread-Roller the fastest, most versatile, most accurate, *most economical* means of thread production available today. Send us samples of the jobs you want to do; we'll do the rest—in quoting you on your requirements.



Ask us for your copy of this twelve page bulletin (TR 49) giving complete details on the Namco Thread-Roller.

The NATIONAL ACME CO.

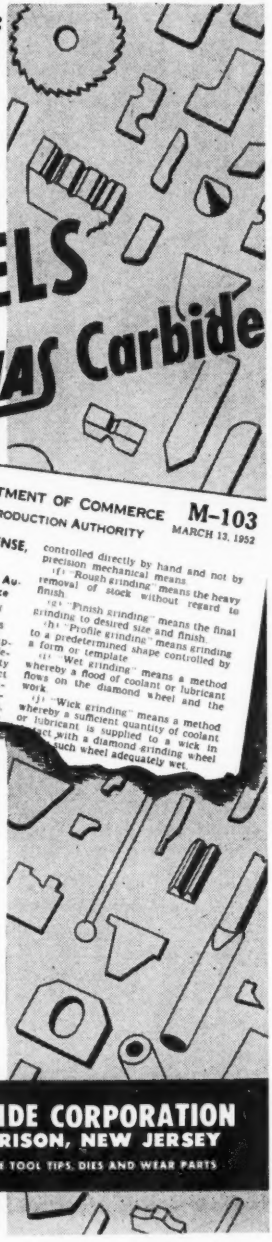
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



CANNY CARBIDE USERS:

CONSERVE DIAMOND WHEELS with preformed ADAMAS Carbide



U. S. DEPARTMENT OF COMMERCE
NATIONAL PRODUCTION AUTHORITY
M-103
MARCH 13, 1952

TITLE 32A—NATIONAL DEFENSE, APPENDIX

Chapter VI—National Production Authority, Department of Commerce

[NPA Order M-103 of March 13 1952]

M-103—Diamond Grinding Wheels

This order is found necessary and appropriate to promote the national defense and is issued under the authority granted by the Defense Production Act of 1950, as amended. In the formulation of this order there has been consultation with industry representatives.

controlled directly by hand and not by precision mechanical means.

(f) "Rough grinding" means the heavy removal of stock without regard to finish.

(g) "Finish grinding" means the final grinding to desired size and finish.

(h) "Profile grinding" means grinding to a predetermined shape controlled by a form or template.

(i) "Wet grinding" means a method whereby a flood of coolant or lubricant flows on the diamond wheel and the work.

(j) "Wick grinding" means a method whereby a sufficient quantity of coolant or lubricant is supplied to a wick in contact with a diamond grinding wheel to keep such wheel adequately wet.

The National Production Authority order M-103 severly restricts the use of diamond wheels by: 1) limiting offhand rough grinding and finishing with resinoid bonded wheels, 2) curtailing inventories to 60 day periods, 3) requiring the use of coolant on all diamond wheel grinding, 4) allowing a maximum of ⅛" depth of diamond and 100 concentration on all wheels.

This regulation will impose no real hardship if you specify ADAMAS preformed blanks because:

★ Careful and accurate preforming to close tolerances assures *minimum stock removal.*

Additional advantages are:

★ *Labor savings*...fewer man-hours required for grinding.

★ *Minimize breakage*...eliminates danger of cracking as a result of overheating.

★ *Conservation*...precious diamond wheels are saved for really important finishing jobs.

★ *Economy*...preforming is done inexpensively by ADAMAS in soft material saving you costly wheels.

***Delivery of ADAMAS** preformed blanks is now scheduled to help in this shortage. An inquiry will quickly demonstrate speed of delivery and economical pricing. If ADAMAS standard blanks fit your requirements, they can be obtained immediately from stock.*

I'd like the new ADAMAS catalog and price list for ordering standard and special tool tips.

Name .....

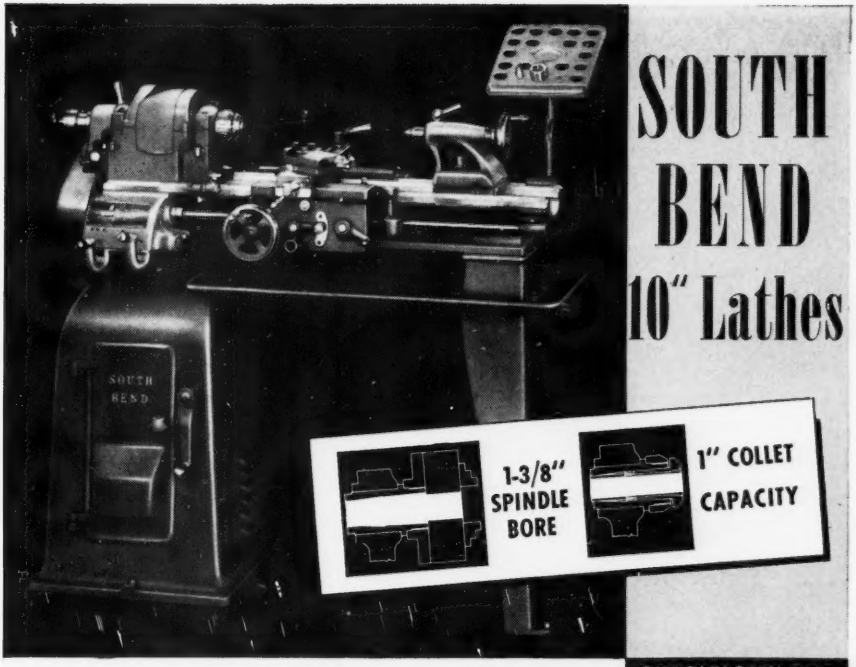
Title .....

Company .....

Address .....

.....

ADAMAS CARBIDE CORPORATION
HARRISON, NEW JERSEY
PRODUCERS OF TUNGSTEN CARBIDE TOOL TIPS, DIES AND WEAR PARTS



SOUTH BEND 10" Lathes

10" *Precision* TOOLROOM LATHE

Sound design, expert workmanship and quality materials give the 10" South Bend Lathe the dependable performance you want. Equipped with a precision lead screw, thread dial indicator and thread cutting stop, you can use it with confidence for cutting screw threads, making precision gauges or turning out instrument parts.

Another outstanding feature is the 1" collet capacity and 1-3/8" spindle bore which is built on the same design and specifications of larger lathes. The large spindle bore gives you big lathe collet capacity in a small, compact unit.

You will like the way this lathe cuts idle time . . . reduces costs . . . releases big lathes for heavy work. Write for catalog.

SPECIFICATIONS

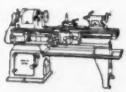
SWING 10⅛" over bed and saddle wings, 5¾" over cross slide.
COLLET CAPACITY.....1 in.
SPINDLE BORE.....1⅜ in.
BED LENGTHS 3, 3½, 4, 4½ ft.
CENTER DISTANCES.....14¾ to 34¾ inches.
SPINDLE SPEEDS (12) 50 to 1357 r.p.m., approximately.
POWER LONGITUDINAL FEEDS 48 R.H. or L.H. . .0015" to .0836"
POWER CROSS-FEEDS 48 . . . . .0006" to .0309"
THREAD CUTTING 48 R.H. or L.H. pitches, 4 to 224 per inch.

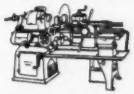
SEND INFORMATION CHECKED:

☐ _____

_____


☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES


☐ ½" and 1" Collet TURRET LATHES

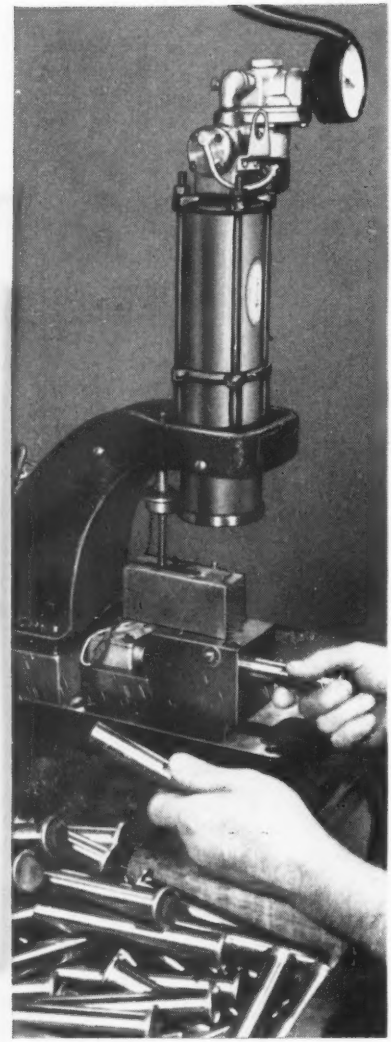

☐ 14" DRILL PRESSES


☐ 7" BENCH SHAPERS

Name_____ Company_____

Street_____ City & State_____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



The Super-Speed Air Motor mounted on a Bellows Air Motor Arbor Stand at Carmel Screw Products Co., Carmel, Ind. Inserting the part in the fixture trips the micro-switch to advance the piston, stamping the part number in the steel rod.

SMALL AIR CYLINDER
Packs Powerful Punch

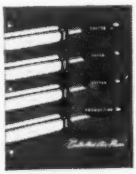
At 100 lbs. air line pressure this Super-Speed 2½" bore Bellows Air Motor develops enough force to punch a ½" diameter hole through $\frac{1}{16}$" thick mild steel. The speed of the piston rod is six to ten times the maximum speed of a standard air cylinder of the same bore.

This extra power makes the Super-Speed suited for a wide range of staking, riveting, forming, swedging, stamping, marking and punching operations which normally require bulky, heavy duty press equipment.

BUILT-IN VALVE AND CONTROLS

The Super-Speed Bellows Air Motor comes complete with either a built-in manually operated valve or the Bellows Electroaire electrically-controlled valve, with or without safety controls. Standard stroke length: 2", 2½",4", 6", 9" and 12".

To learn more about the many ways you can use the wide range of Bellows "Controlled-Air-Power" Devices write for this free book. Ask for Bulletin CL-30. Dept. MM5552.



The Bellows Co.
Akron 9, Ohio

1381

COMFORT "FLIES HIGH"

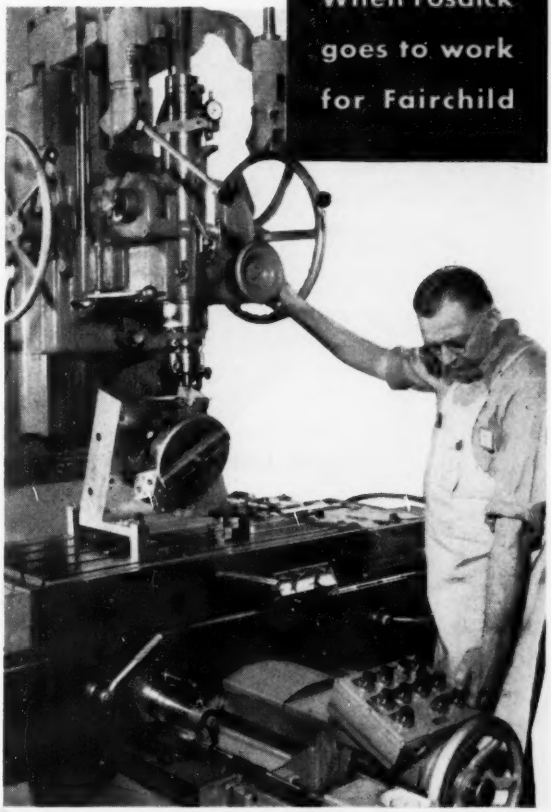
BORING TIME "NOSE-DIVES"

When Fosdick goes to work for Fairchild

■ Trans-Atlantic airline passengers fly in safety high above North Atlantic storms . . . breathe in "living-room" comfort at 25,000 feet — thanks to the cabin pressurizer made by Fairchild Engine and Airplane Corporation. Mass production of the precision magnesium housing unit for commercial and military cabin superchargers demanded speed and unerring accuracy. That's why Fairchild installed Fosdick Automatic Positioning Machines for drilling, facing and boring 31/32" holes to a depth of 1.670". Result? Accuracy to ± .0001" . . . *boring time slashed 40% over previous methods.*

"And equally important," says Assistant Plant Manager C. E. Luhman of Fairchild's Stratos Division, "is the phenomenal flexibility of the Fosdick Automatic Positioning Machine. It's simple to interrupt production — run through 5 or 6 pieces for an experimental unit — and then return to production with an absolute minimum of down time."

If, like Fairchild, *you* need exact reproduction of drilled, bored and tapped parts — plus quick changeover from one job to another — with holes located to tolerances as close as ± .0001" — investigate the Fosdick Automatic Positioning Machine today. It will actually pay for itself many times over through savings in man hours, set-up time, materials and jig storage space. Call your Fosdick Distributor today or write for Bulletin APMMS.



FOSDICK

Fairchild's Stratos Division slashed boring time 40% with this Fosdick Automatic Positioning Machine. A touch of the button positions the work electrically for each new hole to ± .0001" center line tolerance — in seconds! Costly jigs have been replaced by two 5/8" square duplicating bars drilled quickly for the job and stored easily.

RADIAL DRILLS
SENSITIVE AND UPRIGHT DRILLS

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

JIG BORERS
AUTOMATIC POSITIONING MACHINES
SENSITIVE RADIAL DRILLS

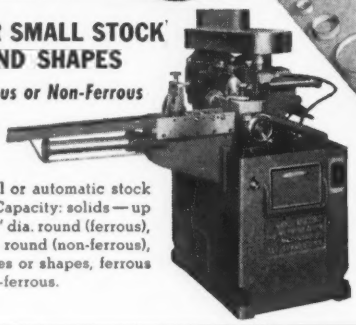
It's the Cost per Cut that Counts..

REDUCE YOURS BY USING THE *Triple-Chip* **METHOD**

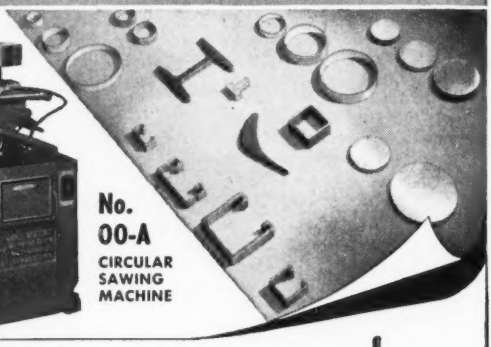
Motch & Merryweather offers circular sawing machines to cut off any size or shape of metal from titanium to magnesium, including high-speed machines for all non-ferrous metals. Triple-Chip saw blades with "Hi-Lo" features deliver square, burrless ends accurate to length. M. & M. automatic blade grinders impart the correct cam-generated tooth form for maximum results. May we present a convincing time study for your operation?

—FOR SMALL STOCK AND SHAPES

Ferrous or Non-Ferrous

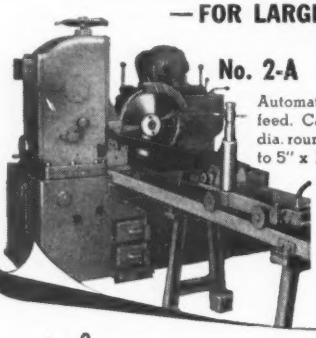


Manual or automatic stock feed. Capacity: solids—up to 1¼" dia. round (ferrous), 3" dia. round (non-ferrous), 3" tubes or shapes, ferrous or non-ferrous.



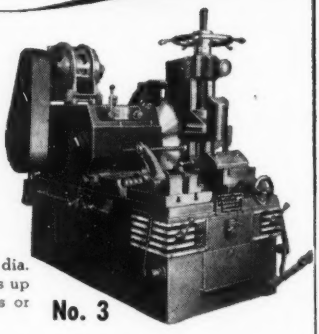
No. 00-A CIRCULAR SAWING MACHINE

—FOR LARGER STOCK...



No. 2-A

Automatic or manual stock feed. Capacity: up to 6½" dia. round; structural shapes to 5" x 12" I-beam. Ferrous or non-ferrous.



Capacity: up to 9⅝" dia. round; structural shapes up to 18" I-beam. Ferrous or non-ferrous.

No. 3

...also 2 still larger sizes—

No. 4 Capacity: up to 16½" dia. round; structural shapes up to 24" I-beam. Ferrous or non-ferrous.

No. 5 Capacity: up to 30" dia. round. Ferrous or non-ferrous.

Besides time studies, descriptive bulletins are yours for the asking.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY

715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

Only M & M builds ALL 3: CIRCULAR SAW BLADES BLADE GRINDER

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



what products do you make that need *permanent*

- ✓ MARKING
- ✓ NUMBERING
- ✓ GRADUATING
- ✓ EMBOSSING
- ✓ DEBOSSING

NOBLEWEST RAPID PRODUCTION EQUIPMENT WILL MARK THEM FASTER — BETTER — AT LOWER COST



Constantly higher marking speeds and lower costs per unit marked . . . have established Noblewest as the world's leading manufacturer of rapid precision equipment for the permanent marking of metal, plastic, hard rubber, wood. Model 157 (illustrated), with new improvements, can be tooled for marking many sizes and shapes of pieces.

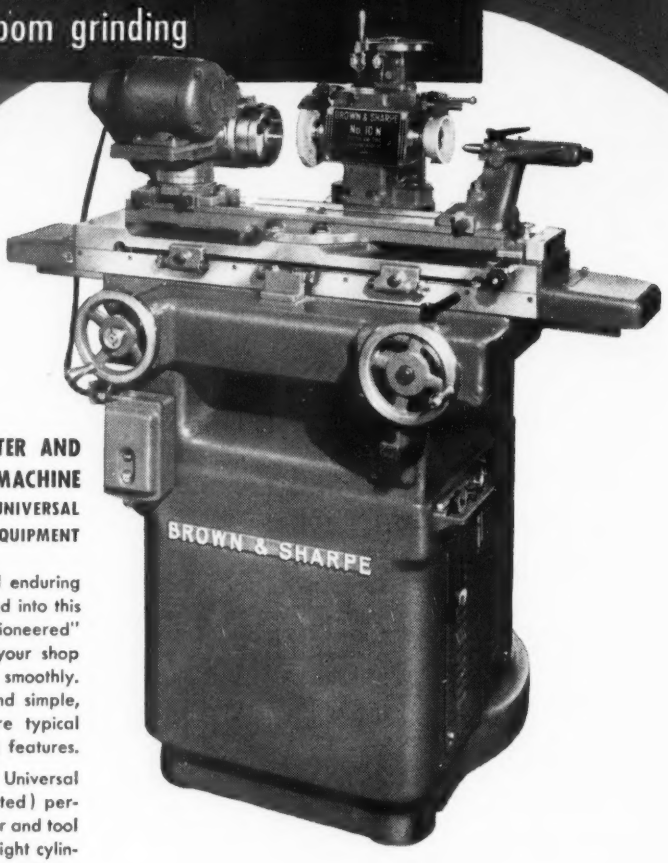
Noblewest is equally famed for fine marking dies. Made to the most exacting standards of quality, only the very finest steel, carefully heat-treated, is used.

For complete details on Noblewest marking machines, tools and dies, write Noble & Westbrook Mfg. Co., 25 Westbrook Street, East Hartford 8, Conn.



B·S *Productioneered*

for toolroom grinding



NO. 10N CUTTER AND TOOL GRINDING MACHINE
WITH UNIVERSAL OR PLAIN EQUIPMENT

Simplicity, flexibility and enduring accuracy are engineered into this machine . . . it is "Productioneered" to keep machines in your shop producing fast and smoothly. Roller-bearing table and simple, convenient controls are typical of many easy-handling features.

The No. 10N with Universal Equipment (illustrated) performs complete cutter and tool sharpening, plus light cylindrical, internal and surface grinding. Write for complete specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Brown & Sharpe

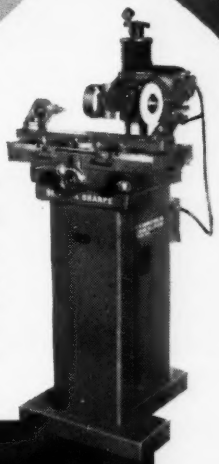
B·S *Productioneered*

for unusually broad utility



NO. 13 UNIVERSAL AND TOOL GRINDING MACHINE

Most versatile of the Brown & Sharpe grinding machines, this model is designed primarily for broad utility in the toolroom — but can also be speedily set up to care for limited over-flow of manufacturing work.



NO. 5 CUTTER AND TOOL GRINDING MACHINE

Especially designed for fast, efficient sharpening of cutters and tools — particularly smaller cutters and end mills. Additional equipment is available to further speed-up sharpening in quantity.

B·S *Productioneered*

for quick sharpening of tools and cutters

SAY "GOODBYE"

TO BIG PROBLEMS WITH SMALL PARTS

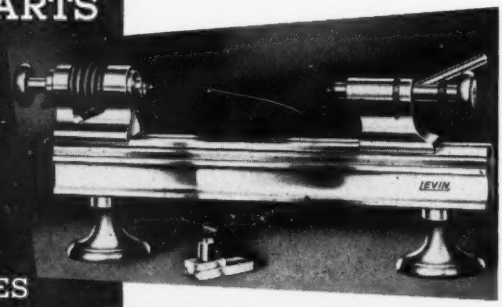
INVESTIGATE

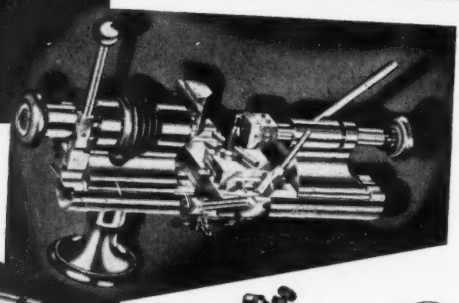
LEVIN®

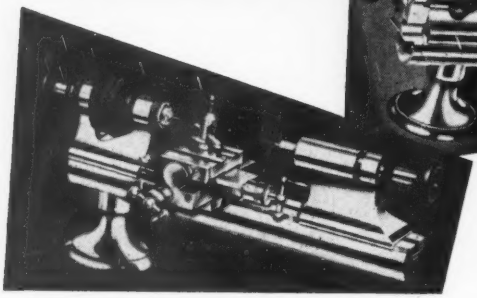
PRECISION JEWELER'S LATHES, ACCESSORIES AND MICRO-DRILL PRESSES

SEND FOR COMPLETE CATALOG

Ideal for second operations or experimental work on small instrument parts where sensitivity is required. Releases expensive, larger lathes for more suitable work. Full line of accessories available.









An extremely sensitive drill press for very small drills down to .002". Drills held in accurate collets to minimize deviation. Spindle run-out less than .0001". Finger tip control enables operator to feel progress of drill.

LOUIS LEVIN & SON, INC.
786 E. Pico Blvd., Los Angeles 21

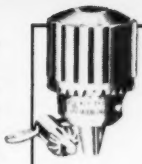


HIGHLIGHT *of drill chuck history*

The tightest, truest tool-holding grip ever devised is at your service in the Jacobs Ball Bearing Super Chuck. Its precision ball bearing construction, assuring tremendous strength and friction-free operation, combine to give you the world's finest drill chuck. No wonder it's the overwhelming choice for heavy duty drilling.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.



Another World Leader. The same special steel alloys, rugged construction and precision craftsmanship combine to make the Jacobs Plain Bearing Chuck unequalled for light and medium duty drilling. It is the world's most widely used chuck.

IF IT'S A

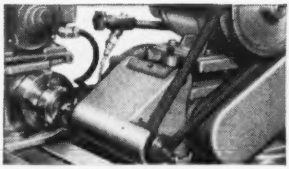
JACOBS

IT HOLDS

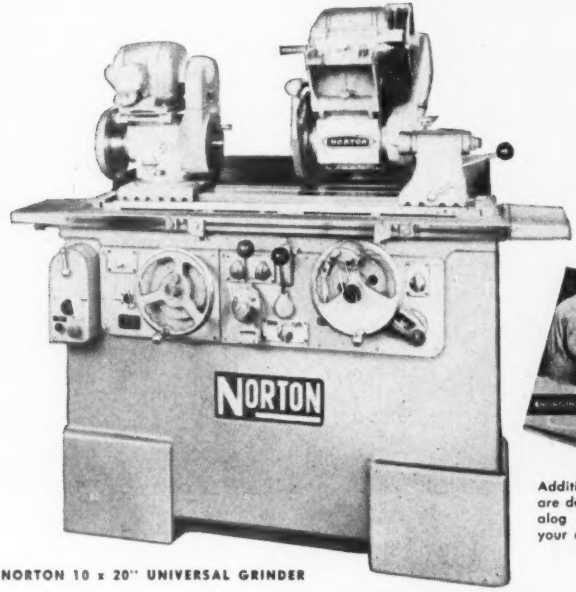
Versatility with a . . .



EXCEPTIONALLY SMOOTH HYDRAULIC TRAVERSE with independent right and left-hand dwell control — automatic wheel feed at each reversal.



INDIVIDUALLY POWERED INTERNAL SPINDLE permanently hinged to front of wheel slide for maximum convenience and rapid set-ups.



NORTON 10 x 20" UNIVERSAL GRINDER



Additional features are described in Catalog 170. Write for your copy today.

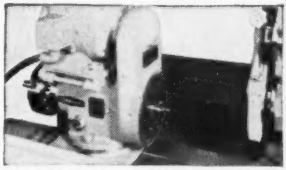
Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASS., U. S. A.

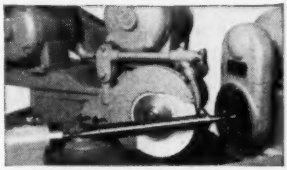
DISTRICT SALES OFFICES: HARTFORD • NEW YORK • CLEVELAND • CHICAGO • DETROIT

NORTON 10x20" UNIVERSAL GRINDER

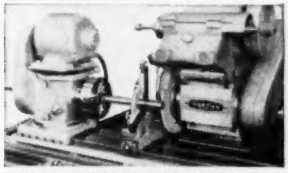
simplified set-up . . . smooth performance



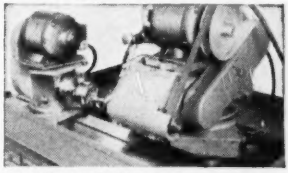
CONVENTIONAL or SPEED CHUCKS may be left permanently mounted on one end of headstock spindle. Headstock quickly swivelled 180° to bring chuck into position.



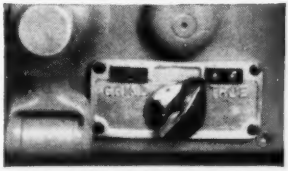
INTERCHANGEABILITY permits reversing head and footstock positions to eliminate necessity of changing wheel and drive to other end of spindle.



HOLLOW SPINDLE in HEADSTOCK allows work up to 1" in diameter (and which is longer than machine) to be passed clear through.



COMPOUND WHEEL SLIDE permits swivelling of wheel head to any angle and wheel feed at any angle.



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The headstock spindle is designed to take a workpiece up to 1" diameter clear through. This permits an extra long piece to be ground by chucking at one end and passing the remainder through.

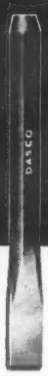
For ease of set-up, the internal spindle is a hinged-bracket type, attached to the front of the wheel slide. This spindle is quickly swung into position for internal grinding — or is as quickly swung out of the way.

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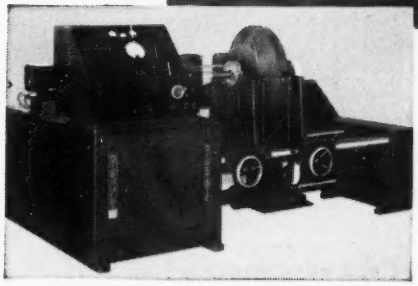


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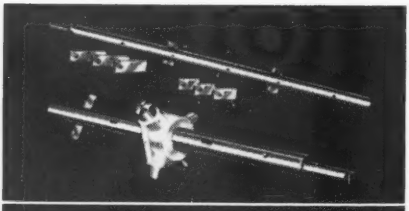
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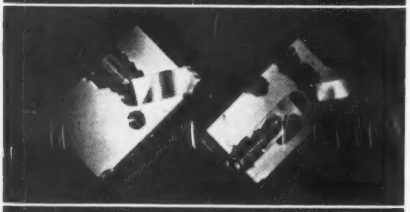
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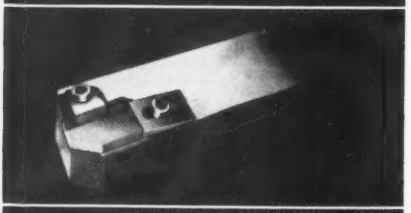
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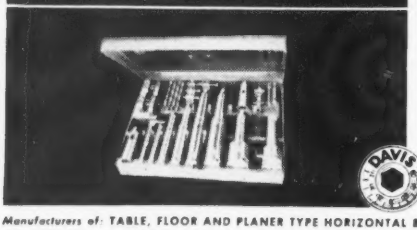


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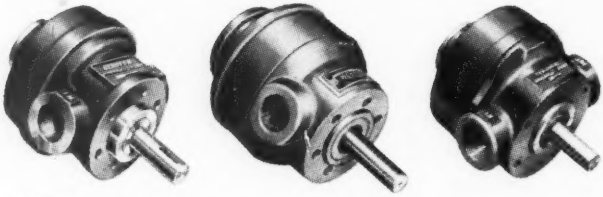
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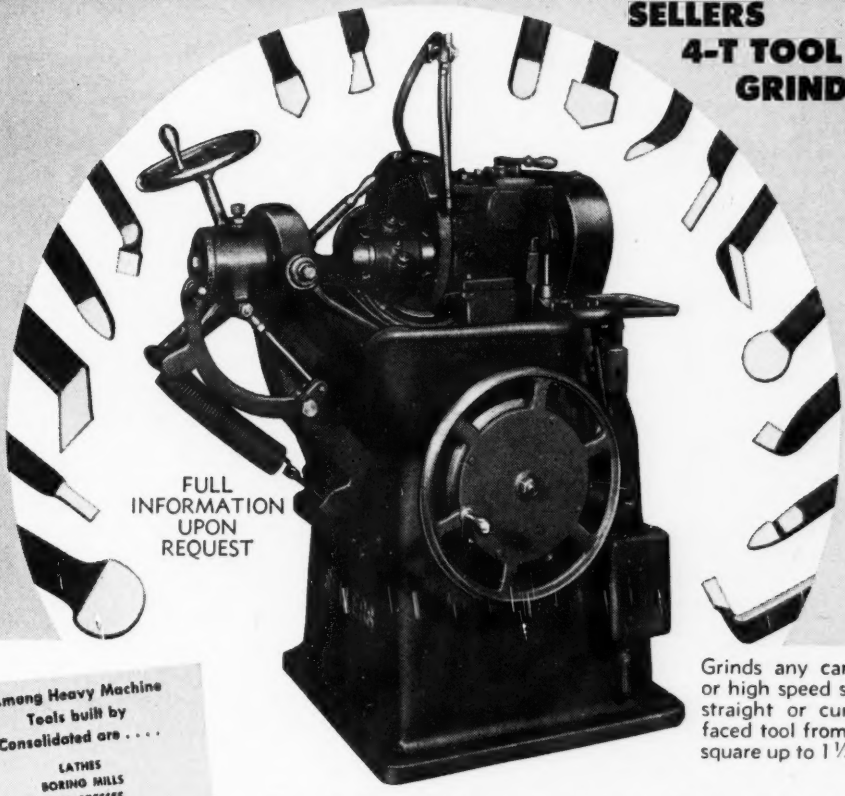
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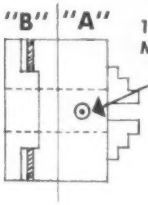
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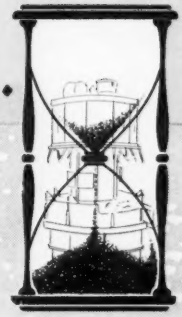
3- and 6-Jaw Chuck — 4" (light duty); 5", 6", 7½" (heavy duty)

2-Jaw Aviation Chuck — 6", 7½" (heavy duty)

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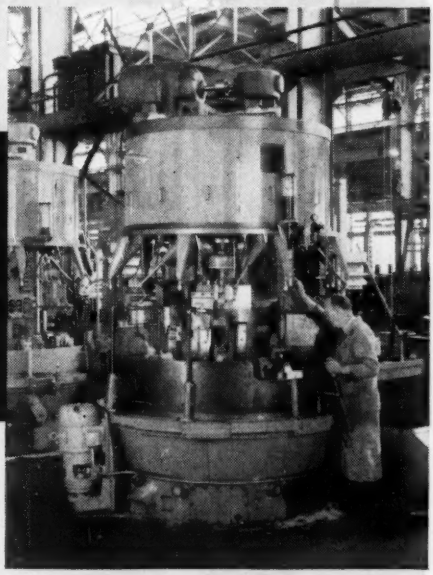
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Over The Editor's Desk

Lincoln Incentive System Vindicated

AFTER ten years of litigation, making one of the longest tax cases on record, a fifteen-judge United States Tax Court last month announced a decision which completely vindicates the incentive system of the Lincoln Electric Company, payments in which were questioned by the Commissioner of Internal Revenue. According to charts produced as evidence in the case, Lincoln's productivity per worker increased at an average rate of 15.3 per cent per year for the past eighteen years, prices have been reduced about 50 per cent and wages have been double those normally paid in industry.

The case was started in 1942 when the Commissioner of Internal Revenue questioned Lincoln's 1941 payment of some $500,000 for employee annuities and $1,000,000 for an employees' trust fund. Throughout the long litigation, Lincoln argued that the results achieved by its incentive system establish that the payments are proper and reasonable. The court in upholding Lincoln's position and vindicating its incentive system stated: "The record clearly establishes that the company's incentive system materially contributes to increased production, enhanced earnings, reduced selling prices, avoided labor strife and work stoppages, developed and retained a cooperative, loyal, efficient and satisfied force of employees."

Statement of the Month

IN 1951 supplies of lead in the United States were greatly reduced by the diversion of lead to foreign buyers because they were willing and able to pay in excess of the ceiling prices to which domestic consumers were required to adhere by the Government.

—Lead Industries Association

o

Between Ourselves

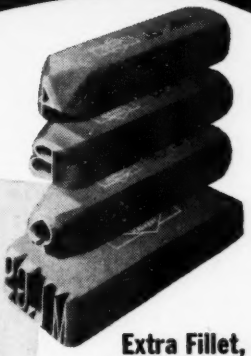
LAST month, Vice-presidents John M. Krings and Granville M. Fillmore completed twenty years service on the sales staff of Modern Machine Shop. To mark the occasion, a luncheon in their honor was held at the Cincinnati Club, at which time Richard S. Kline, General Manager, presented each with an appropriately engraved wrist watch. Shown left to right in the accompanying illustration are Mr. Krings, Mr. Kline, and Mr. Fillmore.



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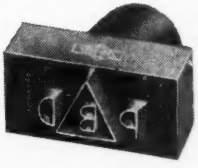


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(female shown)

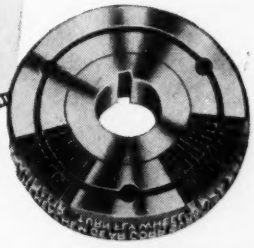
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FEATURES IN THIS ISSUE

MODERN Machine Shop

MAY, 1952
Vol. 24, No. 12

High Temperature Alloys Challenge Accepted Machining Methods
By P. G. DeHuff and D. C. Goldberg

As members of the Westinghouse Aviation Gas Turbine Division, the authors of this article tell of some of their experiences encountered in the machining of new alloys which have been developed for use in jet aircraft engines. Anyone confronted with the problem of machining such alloys will find this article particularly useful. Page 98.

Re-finishing Worn Engine Cylinders ***By Gilbert C. Close***

The story of the Spar-Tan Engineering Company operations where the "Porus-Krome" process is being used to re-finish and reclaim worn or rejected work. Page 118.

Machining Magnesium ***By Frank Charity***

Concluding the discussion which covers the unique properties of magnesium and magnesium alloys together with recommended methods of machining. Page 138.

Helpful Hints on Coolant Use ***By John E. Hyler***

This article provides practical data on coolant fed tools and accessories with particular emphasis on the use of coolants in drilling operations.

Unusual Presses and Dies ***By C. W. Hinman***

Descriptions of several time and labor saving devices which point the way toward higher production and better workmanship. Page 166.

Flow Form Dimpling ***By Bartlett West***

In which the author describes a new process in use at Northrop Aircraft which prevents warpage, cracking, and brittleness formerly encountered in cold-formed dimpling operations. Page 184.

Training New Operators ***By John Prati***

This story tells how International Harvester indoctrinates new employees. Particular emphasis is placed on properly acquainting the new employee with safety measures. Page 194.

Typical Cam Forms Accurately Band Machined ***By H. J. Chamberland***

The author tells how a variety of parts such as cams, gears, racks and similar contoured parts may be quickly and economically cut by means of the band machining method. Page 208.

A Gaging Policy ***By Thomas J. Bizzoco***

In which the author tells how maximum efficiency can be obtained from gaging facilities. Page 222.

High Temperature Alloys Challenge Accepted Machining Methods

From a paper presented at the sixteenth Westinghouse Machine Tool Electrification Forum

By P. G. DeHuff and D. C. Goldberg
Aviation Gas Turbine Division
Westinghouse Electric Corporation

THE development of the gas turbine as a practical reality is partly due to the metallurgist's unceasing efforts to create alloys which have better mechanical properties. This unceasing effort to create new alloys is recognized as an absolute necessity if the exacting demands of the jet engine are to be met. It has been only recently, however, that the engineers have appreciated what the development of such alloys means to the machine tool industry and the fabricator.

New tooling methods and machines are required to produce the jet engine parts if they are to be built in the volume needed. Machine tools must be designed to meet the demands of the tougher alloys, components of larger diameter and thinner wall sections, close tolerances, interchangeability, and higher production rates. This means increased horsepower, heavier beds, better bearings, variable speed drives, and automation in handling and contouring.

In the machining of high temperature alloys, as with other steels, the optimum aim is long tool life, rapid removal of metal, low power input, and satisfactory surface finish. It may be readily observed that in roughing operations the chief goal is to remove metal as rapidly as is economically possible, while in finishing the attainment of the desired microinch finish and accurate contour is required.

In order to achieve these goals, it is necessary to consider the following seven basic factors, variations in any one of which will have an immediate effect on the production rate and the quality of the completed part: (1) Inherent machinability of the alloy; (2) Design of the part being fabricated; (3) Design and type of the cutting tool; (4) Capacity and rigidity of the machine tool; (5) Accessory tooling; (6) Feeds and speeds; and (7) Coolants.

Let us examine each of these basic factors:

Inherent Machinability of the Alloy

Table I shows the analysis of some of the alloys used in jet engines. These alloys are generally considered to be

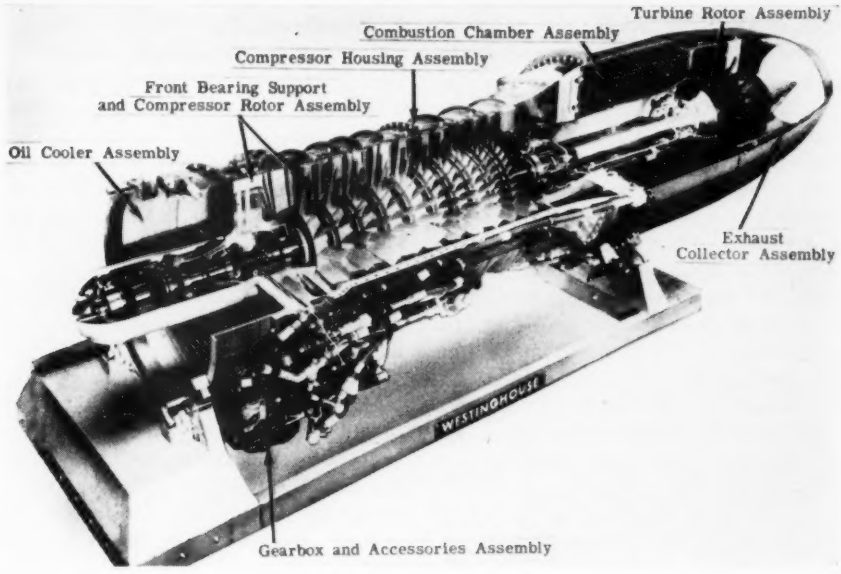


Fig. 1—Cutaway view of J-34 jet engine.

in the difficult-to-machine class. It is not strange to find such elements as cobalt, chromium, molybdenum and titanium as major constituents of the alloys. Those who are familiar with cutting tools will recognize that these same elements make up the high-speed cutting tools. An excellent example of this condition is the use of Stellite for rotating turbine blades. This material has long been used for cutting-tool tips. Such parts are rarely machined to shape but are cast close to finish size and ground.

Table II shows the parts application for these various alloys. The decision to make a part from a specific alloy depends upon meeting the stress requirements, corrosion resistance, and whether the material will be available for production quantities. From an examination of a typical jet engine, Figure 1, it is apparent that as one proceeds from the compressor end to the turbine end, the alloy content of the parts increases.

As the alloy content of iron base materials goes up, the machinability index goes down. This situation is readily understandable when you consider that, as the metallurgist adds specific elements to increase hot strength, he also increases the resistance to cutting shear. For example, the shear strengths in cutting for high temperature alloys are high—in the order of 135,000 psi—as compared to 109,000 psi for AISI 347.

Besides this factor of shear strength, other indices are useful in determining the inherent machinability of an alloy. The coefficient of friction is significant as well as being easy to control since changes in coolants, feeds, speeds, and

tool design affect its magnitude immediately.

The plastic properties of the metal have an important effect on the machining constant. Variations in this index are controlled by varying thermal heat treatments. Recent work by various investigations has shown that this factor has a direct correlation to the shear angle of the chip formation. The larger the shear angle, the thinner the chip, and the better the machinability.

These three factors—shear strength, coefficient of friction and machining constant—plus the hardness, strain hardenability, and the amount of abrasive particles on the metal all affect the inherent machining qualities of the alloy. Tables III and IV summarize the effect of these factors upon the inherent machinability of some high temperature alloys.

Design of Parts Being Fabricated

Basically, the axial-flow gas turbines consist of a series of thin-walled circular elements bolted together and containing the rotating elements. The design trend is toward larger diameters and still thinner sections so that increased thrust can be developed for a minimum engine weight.

These parts are made from material that is received in the cast or forged condition as sheet metal or bar stock. In the cast condition, the part is cast as close to shape as is practical and then given a solution anneal to establish its optimum machining condition. Centrifugal castings are used to an ever increasing extent.

One part, a large diameter turbine shaft, first weighed close to a 1000 pounds as a solid forging. When this part is completely machined it weighs only 60 pounds. This means extensive machining time. By going to a centrifugal casting or to an extruded and upset tubing it will be possible to make large savings in the total time required to completely machine the part. This will also reflect extensive savings in tooling cost.

Compressor disc forgings once purchased as pancakes, now are obtained as contoured forgings. Each of these changes has been made to reduce the amount of machining time on these high temperature alloys.

Because the jet engine has to be in

Table I—Nominal Analysis of Some Alloys Used in Jet Engines

	Fe	C	Cr	Ni	Mo	Co	Al	Mn	Ti	Cb	W	O
Titanium 150A	1.3	.05 max	2.7	...	...	...	...	...	Bal	...	...	.30
Titanium 130B	...	.2 max	...	...	...	...	4	4	Bal	...	...	...
Titanium PDS9466	1.2	.6 to .2	2.5	...	...	...	...	...	Bal	...	...	.08N
AISI 347	Bal	.08	18	10	...	...	...	...	...	.8	...	...
AISI 410	Bal	.15	12	...	...	...	...	...	...	...	...	...
Inconel "X"	8	...	15	73	...	...	.7	...	2.5	1	...	...
Refractaloy 26	Bal	.05	18	37	3	20	.2	.7	2.6	...	...	...
Discaloy 24	Bal	.05	13	26	3	...	.1	.8	1.6	...	...	...
Timken 16-25-6	Bal	.15	16	25	6	...	...	...	...	...	...	N_2-.18

Table II—Parts Application of Various Alloys.

MATERIAL	FORM	PARTS
Titanium	Forgings Bar Stock	Compressor Discs, Housings Bolts, Blades
AISI 410	Forgings Bars	Compressor Discs, Flanges Blades, Shafts
Discaloy	Forgings	Turbine Discs, Shafts Boss
Refractaloy	Precision Castings	Nozzle Vanes, Bolts
AISI 347	Bar Stock Sheet Casting	Bolts, Clamps, Flange Housings
Inconel "X"	Bar Stock Sheet	Blades, Bolts, Flanges Housings

perfect static and dynamic balance, the close tolerances that have to be maintained on all parts pose another problem. A finish-machined compressor disc has a cross-section of less than 0.100 inch in some places. If you have ever tried to remove a few thousandths of an inch from a material which is not fully stress-relieved you know what happens—it distorts. This will occur on a disc which is not stress-relieved. The English engineers have overcome this by finish-machining both sides of a disc simultaneously. American manufacturers should consider this inasmuch as the present trend in disc design does not indicate thicker sections.

Many parts are designed with liberal radii to prevent stress concentrations. Sometimes through the oversight of the designer many different radii will be incorporated in the same part. This raises a machining problem which will be dealt with more fully in a later section. At the present time, it necessitates a considerable amount of hand feeding and blending.

The use of materials that contain very hard carbide particles in a tough matrix, such as the high temperature alloys, necessitates the use of tools that are abrasion and shock resistant, and have high hot hardness. Carbide tooling is common practice in the jet engine industry today. Standardization of single-point cutting tools has been established along with the most desirable tool design for most of the alloys being used.

The Meyer exponent, which is established from a series of concentric Brinell impressions, is generally used in the machine tool industry as a measure of the work hardening characteristic of materials. Because the majority of these alloys exhibit a marked tendency to work-hardening, tools must always be rigidly supported and must have keen cutting edges. The Meyer exponent for several of the high temperature alloys is shown in Table IV.

Many jobs have been overcome by changing rake angles on a tool. In general, the higher the Meyer exponent, the greater must be the clearance angles. Not only does a tool have to be designed to do the job called out by

Table III—Nominal Physical and Machining Properties of High Temperature Alloys.

	Condition	Brinell Hardness	Shear Str. in Cutting PSI X1000	Meyer Exponent	Unit Power HP/Cu.in./min.
Titanium					
Ti 150A	As Forged	320	105	2.07	1.25
RC 130B	As Forged	320	110	2.10	1.25
PDS 9466	As Forged	300	118	2.15	1.27
Stainless Steel					
AISI 347	1/2 Hard	262	109	2.08	0.87
AISI 410	Annealed	190	97	2.22	0.82
	Harden and Tempered	300	109	2.11	0.92
Super Alloys					
Inconel "X"	Solution Tr.	280	135	2.37	1.30
	S. T. & Aged	315	145	2.25	1.26
Refractaloy 26	Solution Tr.	152	137	2.39	1.08
	S. T. & Aged	270	148	2.15	1.28
Discaloy 24	Solution Tr.	150	120	2.24	1.04
	S. T. & Aged	270	132	2.07	1.16
Timken 16-25-6	Solution Tr.	187	115	2.24	1.05
	Work Hardened	274	127	2.09	1.18

the print, but it has to be designed for the material. To prevent excessive tool wear and reduce the contact of the chip with the tool, intelligent use of a chip breaker is of extreme value in machining these alloys—particularly in turning, drilling, and broaching.

Capacity and Rigidity of Machine Tools

It has been mentioned that high temperature alloys are considerably tougher to machine than AISI or 347. On a machinability index*, the former is rated at 50 per cent whereas the latter is rated at 35 per cent. Inconel X on a similar scale would be about 5-10 per cent and Discaloy 20 per cent. This means considerably more power is required to machine a part from Inconel X than from one of the stainless steels.

Most of the engine lathes used in roughing operations are powered with 20-hp motors. Roughing out discs on such a lathe taxes the equipment to a maximum. If the operations are performed on vertical turret lathes, which are equipped with 30-hp motors, conditions improve considerably. Heavier cuts can be taken at optimum speeds. It is quite possible that 50-hp motors will soon be needed on lathes and boring mills if they are to be able to rough out discs and housings in the quantities and at the speeds which are needed.

An additional consideration which is of vital importance is the factor of ever increasing diameter of the parts. In the near future a majority of the engine lathes will not be usable for compressor disc work. Lathes with a 60-inch swing will be required. In finish turning, the need for heavy duty lathes is absent. Lathes with hardened bearings, and special variable speed

* The machinability index is a rating of the ease of turning a material when compared to B1112 steel.

motors with shaved and hardened gears must be used. Many manufacturers are now making T-bed lathes to fulfill this requirement. Volume will be needed to do the job that is being planned.

For best results, lathes which are designed for fast roughing should not be used for the precise finishing operations.

Figure 2 shows that the optimum machining characteristics of these alloys are limited to a fairly narrow surface-edged-speed range. This problem becomes critical when it is considered that in the turning of a disc with a diameter of 30 inches the surface speed can vary considerably.

Contour machining of discs is difficult when done by hand feeding. It need not be so if there is incorporated a means for having the operation controlled from a master tracing. Many automatic feeding heads are available today such as cams, templates, magnetic wire, punched tape, and others. All have merits. It would be well for us in the jet-engine industry if the machine tool industry would establish their most promising design and start producing in volume.

Now that we have made our machines more and more automatic, we have a problem to consider which is overlooked too frequently—how do we dispose of the chips automatically? These automatic machines lose much of their value when the chips are allowed to accumulate.

Faster and more rigid methods of clamping are needed to accompany the trend of automation in tooling. Clamping is the stepchild of the industry. It is not unusual to see a fully automatic tool with hand-clamping devices.

Feeds and Speeds

Figure 2 shows the effect of varying cutting speed on tool life for five different alloys. In this work, a cast iron cutting grade of carbide was used in conjunction with a 0.010 feed and a 0.100 depth of cut. Remembering that AISI 347 has a machinability index rating of 50 per cent, it is not difficult to recognize the problems encountered in machining these alloys.

Table IV—Effect of Basic Mechanical Quantities on Forces, Surface Finish and Tool Life.

Property of metal being cut—A **decrease** in the given property has the following effect:

	Known effect on forces and power consumption	Usual effect on surface finish.	Probable effect on tool life
Machining constant, C.....	Bad	?	Bad
Shear Strength, Ss.....	Good	None	Good
Coefficient of friction, u.....	Good	Good	Good
Hardness, H	*	None	Good
Strain Hardenability, n.....	*	Good	Good
Amount of abrasive particles..	*	None	Good

* Do not contribute

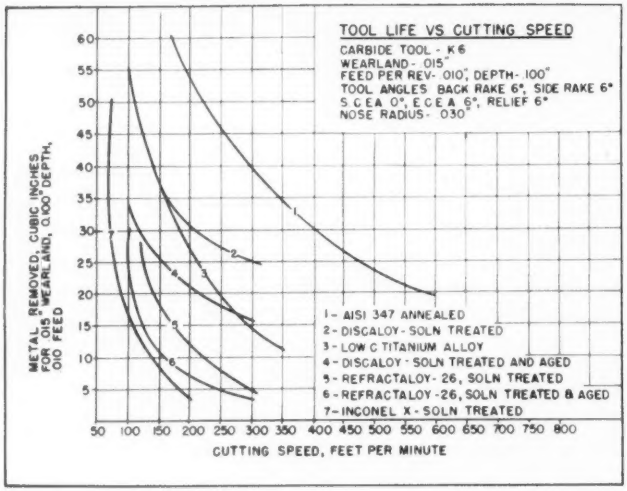


Fig. 2—Graph showing plotting of tool life vs. cutting speed for five alloys.

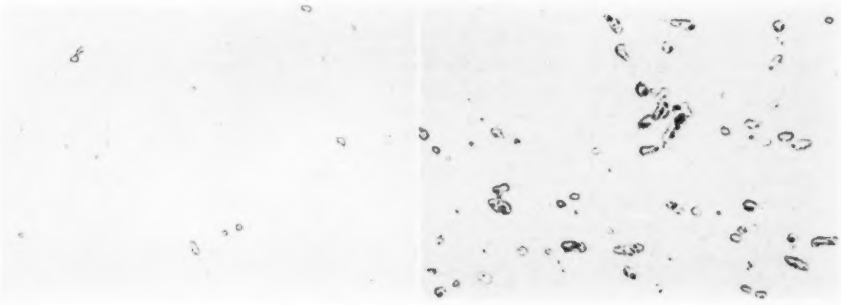
Of particular significance is the steep climb in volume of metal removed at the lower range of speeds. Although not shown in Figure 2, volume factor increases rapidly with increasing feed and depth of cut. Advantage cannot be taken of this unless the machine tool builder constructs a more rigid machine powered with higher horsepower motors. These data also confirm the need for the variable speed motor so that continuous advantage can be taken of the optimum machining characteristic of the alloy being used.

Surface finish is dependent upon feed and speed as in all finishing operations. It is accentuated in the high temperature alloys due to their work hardening characteristics. If these parts are finish-machined in the hardened condition, this factor diminishes in importance.

Coolants

Every shop has its favorite coolant and it changes almost every month in its popularity. It is axiomatic that if the action of the coolant is to be of value it has to be available at the cut-

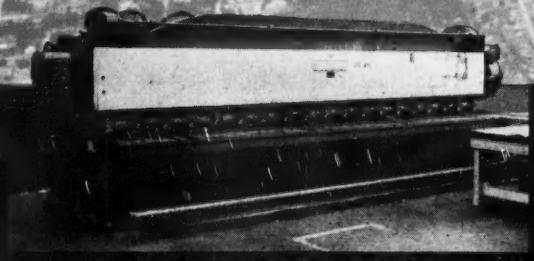
Fig. 3—The effect of carbon cement on the microstructure of 1.0 per cent iron, 2.5 per cent chromium titanium alloy. Specimen at left contains 0.24 per cent carbon, while specimen at right contains 0.7 per cent.





CINCINNATI Shears at CONVAIR

Photos: Courtesy Consolidated Vultee Aircraft Corp., Fort Worth, Texas.



This $\frac{1}{4}$" x 18' Cincinnati All-Steel Shear, one of the Cincinnati units at Convair, has the length to cut full length standard sized sheets.

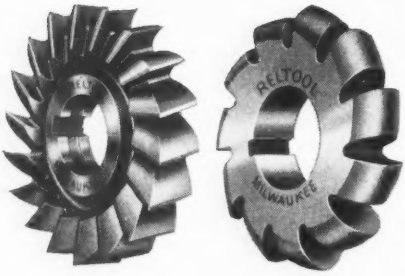
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ting edge at the instant of cutting. This type of thinking has led to the application of carbon dioxide and of the Gulf Hi-Jet process.

Carbon dioxide is only a coolant whereas in the latter process it is possible to have a chemical reaction at the tool tip-work piece interface to form a soft ionic chloride crystal on the tool to act as a lubricant. That this happens has been proven by the use of carbon tetrachloride as a coolant. It

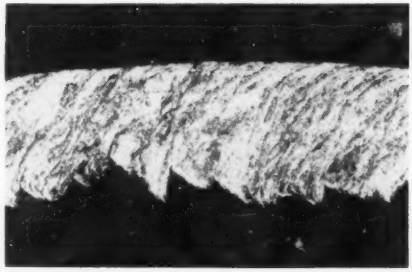


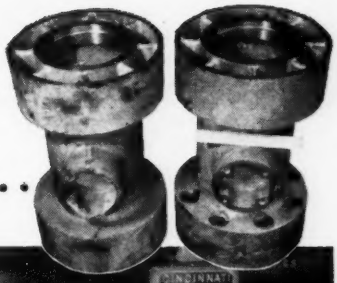
Fig. 4—Illustration showing typical chip from a high carbon titanium part.

has no lubricity, but it does furnish chloride ions to the tool tip.

By the intelligent use of coolants, a machining job can be aided. However, too often the coolant is cooling the work or the tool but not the cutting zone and, therefore, no value is received. Consideration should be given to having the coolant feeding through the tool post or tool shank.

No discussion of this type is complete without the mention of titanium and its alloys. There has been a considerable amount of literature on the machining of titanium. Some of it is sound, quite a bit has been hearsay. Westinghouse has been investigating the application of titanium for compressor discs and other parts for jet

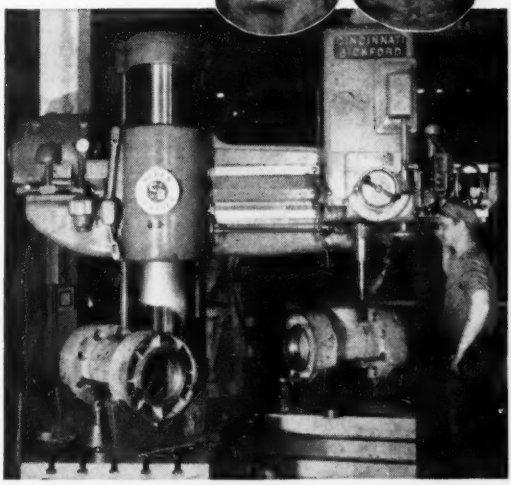
saving 2½ hours per piece.....



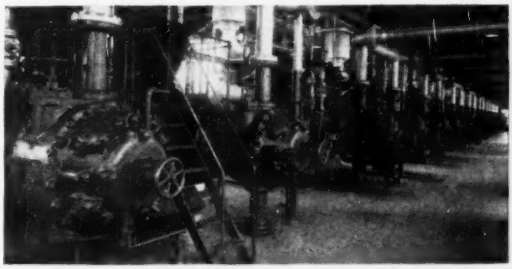
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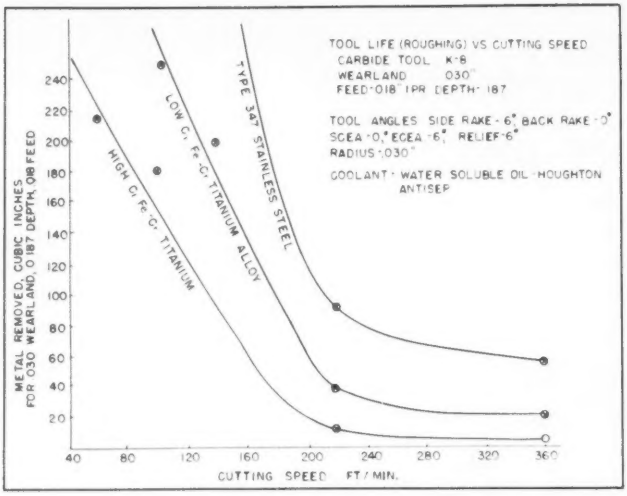


Fig. 5—Graph showing plotting of tool life vs. cutting speed for rough cuts.

aircraft for the past several years.

In these studies data have been accumulated pertaining to the machining characteristics of this new material. With proper alloy selection, tool design, and use of recommended feeds and speeds, titanium is machinable but still with difficulty.

Figure 3 illustrates the effect of carbon on the micro-structure of the 1.0 per cent iron-2.5 per cent chromium titanium alloy. It should be noted that

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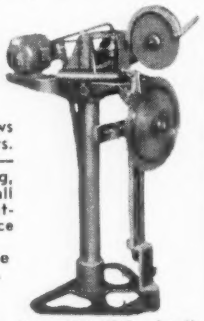
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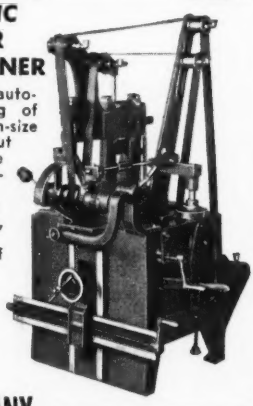
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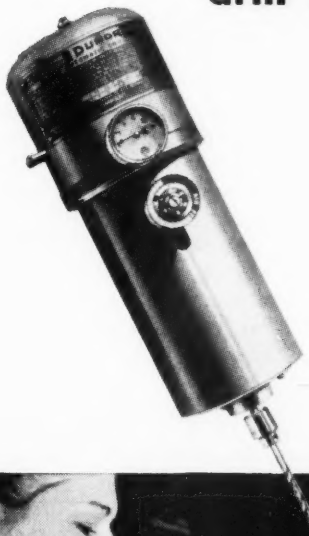
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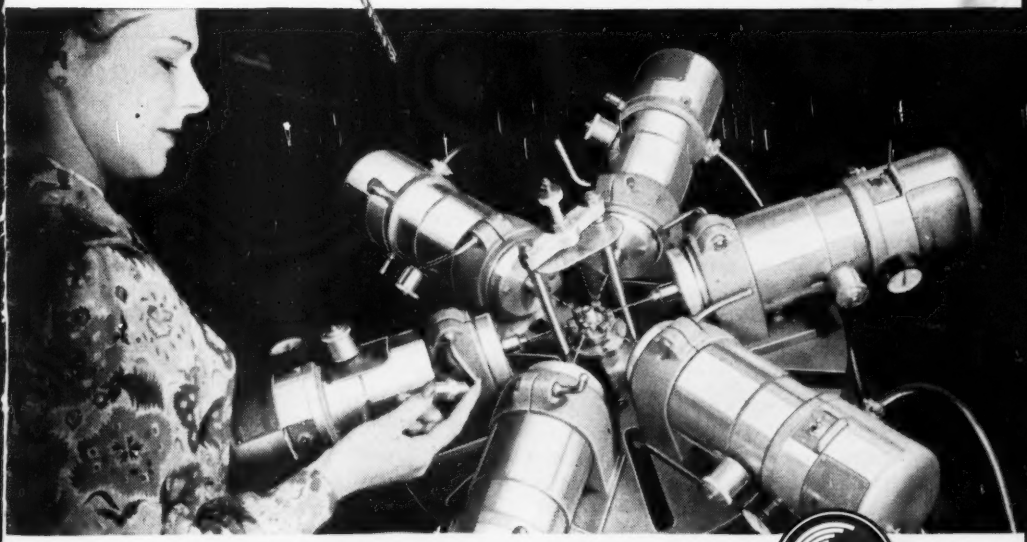
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This unusual setup is typical of the many ways that the Dumore Automatic Drill Head can save costs on a production problem. Here labor costs on bronze nozzle holders were slashed $75 on the first run of 5273 pieces.



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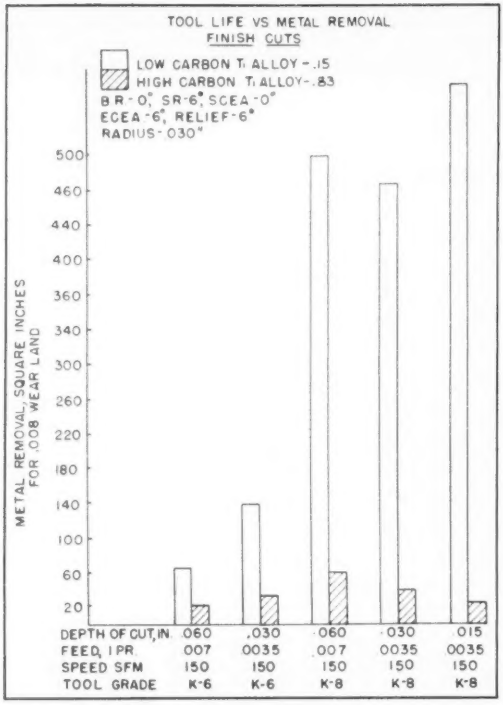


Fig. 6—Graph showing plotting of tool life vs. metal removal for finish cuts.

there is an increase in titanium carbides in the alloy with the 0.7 per cent carbon as compared to the alloy with the 0.24 per cent carbon. Because titanium carbide is harder than the tungsten carbide found in most tools, excessive tool wear will result.

The matrix metal is characterized by being work-hardenable to a degree below that of the 18-8 stainless steels but is tough and has a high shear strength. In addition, it has the tendency to smear or build up on a tool. A typical chip from a high-carbon titanium part is shown in Figure 4.

Because of these properties, the material falls into the difficult-to-machine class. Figures 5 and 6 show how increased tool life can be obtained by varying the carbon level in the material and by using hard grades of carbide.

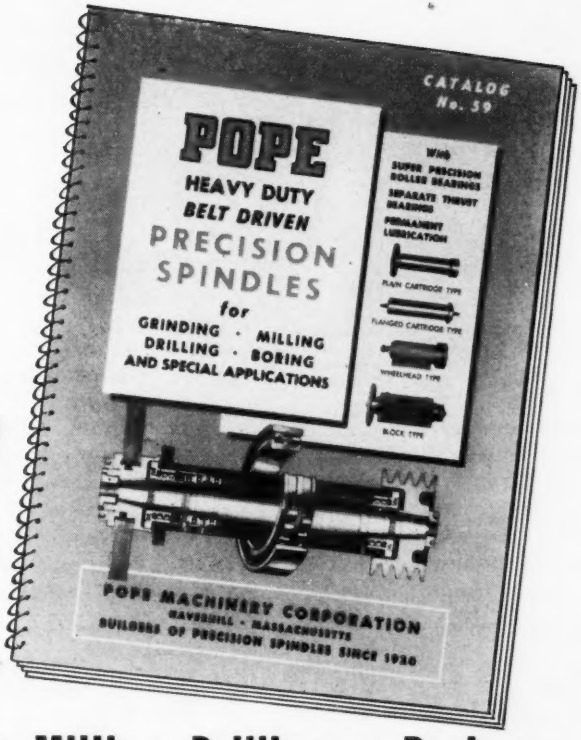
Figure 7 shows the appearance of two different grades of carbide tips — super hard on the right and a cast iron cutting grade on the left after turning the low carbon-iron chromium titanium alloy. The tip on the right has removed 250 sq. in. compared to 65 sq. in. for the one on the left. The test was run at 150 sfm., 0.007-inch feed, and 0.060-inch depth of cut.

Figure 8 shows two superhard carbide tips which have been used to machine titanium. The one on the left removed 470 sq. in. at 0.0035-inch feed and 0.015-inch depth of cut of the low carbon titanium alloy. The one on the right with the same speed and feed removed only 25 sq. in. of the high carbon titanium.

With such intensive research, Westinghouse now feels that titanium can be machined as readily as the 12 per cent chromium stainless steels which have been used for compressor discs. As an example of what combined research and development can do in solving a problem, the cooperation of the U. S. Broach and Detroit Broach Companies with Westinghouse is notable.

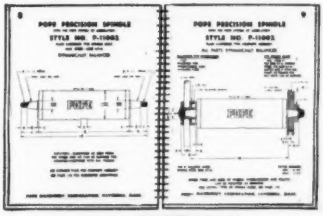
In the beginning, two pass broaches were designed using 18-4-1 high speed steel. Some five or six slots were

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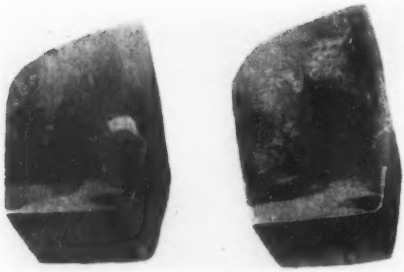


Fig. 7 — Illustration showing two different grades of carbide tips—super hard at the right and cast iron grade at left.

broached and size was lost. Some improvement was shown by going to 18-4-2 and 18-4-2 plus 5 per cent cobalt. By proper design and the present use of carbide-tipped broaches, titanium can now be handled in production schedules. However, the use of two-pass broach still has a major disadvantage due chiefly to the lack of rigidity in the broaching fixtures and insufficient power in the broach. This lack of rigidity results in misalignment and movement of the disc. Use of a single pass overcomes this objection to some extent. To go to the single pass broach, machines of greater length and power are required.

Broach capacity is very limited today in light of present production requirements. Present broaches of the 72- and 90-inch capacity will not be adequate; the 120-inch will be required. Broaches must have greater rigidity of the bar, fixtures, and jigs. Increased attention will have to be paid to the affect of cutting design on the forces placed on the machine tool.

In conclusion, it is well to point out that, coupled with the sound machin-

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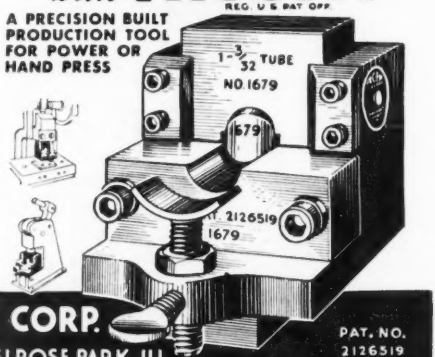
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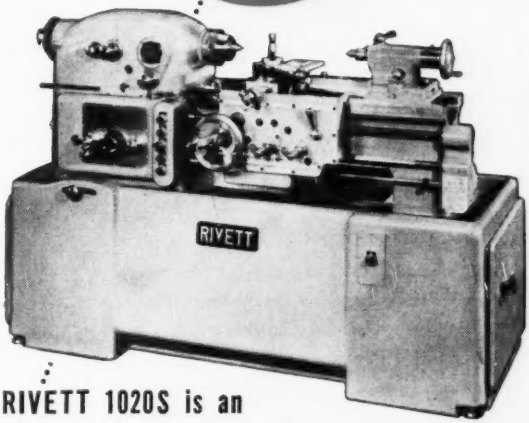
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2 FOR 1

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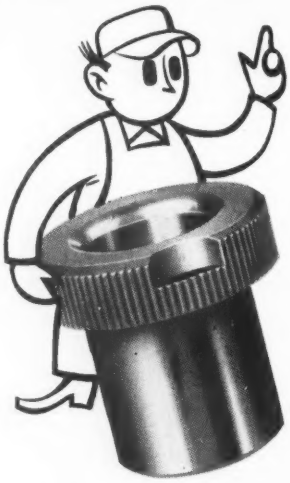


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ing practice which is required with the machine tools which have the necessary power and versatility, attention must be directed to the unusual or new approach to machining.

For instance, at Westinghouse we are investigating the use of carbon dioxide as a coolant in machining and the use of Gulf's Hi-Jet process. Other companies have considered the use of hot spot machining. New types of tooling have to be considered as well as new machine tools. The metallurgist is working full speed to make stronger and tougher alloys which will undoubtedly be more difficult to machine. Will our machine tools be able to keep pace with the new metallurgical developments? We believe that through cooperation with the machine tool builders this can be achieved.

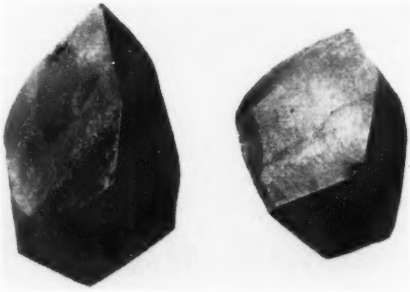


Fig. 8—Illustration showing two super hard carbide tips which have been used to machine titanium.

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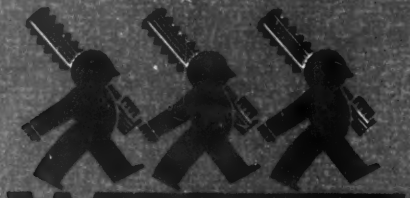
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Re-finishing Worn Engine Cylinders

Plating provides economical method of reclaiming worn workpieces

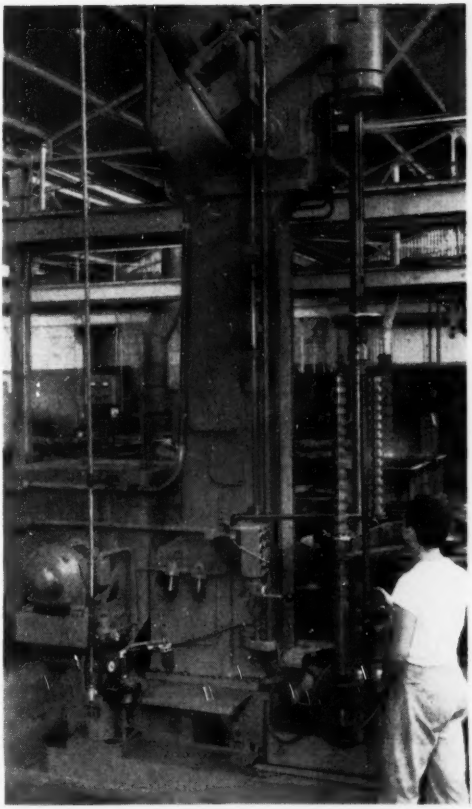
By Gilbert C. Close

FOR as long as the present critical world situation continues to exist, with concurrent material and machine shortages, one facet of industry closely allied with product finishing will continue to mount in importance. This facet deals with the re-finishing or reclamation of worn machine elements and parts. In many cases this refinishing work will parallel closely the final

Incoming railroad diesel engine cylinders, worn beyond further use and ready for rebuilding.



After stripping (if they have been previously plated) the cylinders are honed to accurate oversize (within 0.0005-inch tolerance) on this large, specially built Barnes Drill Company hone. All defects such as ring-steps, taper and out-of-round, are corrected at this time.



operations of the original manufacturer. Other types of reclamation work may be more difficult than original finishing due to defects and irregularities that develop in the part during its period of service.

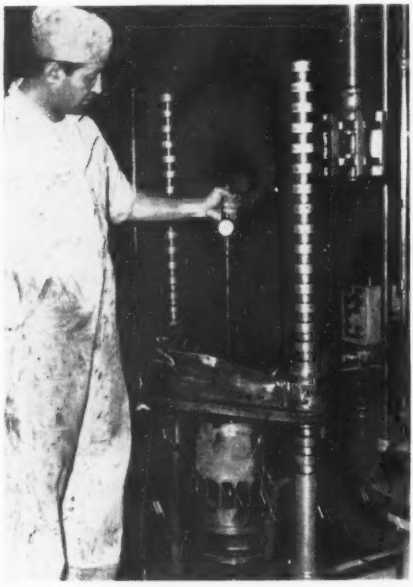
In many cases, when and if it is obtainable, it is cheaper to buy a new part than to try and reclaim the old one. In other cases the re-finished part will turn out to be an inferior product at best, with limited service life and doubtful dependability. Neither of these statements apply to the parts being reclaimed in the plating shops at Spar-Tan Engineering Company, Los Angeles, California. At Spar-Tan, hundreds of engine cylinders are reclaimed each month at from 50 to 75 per cent of new cost and with a promise of from 3 to 5 times normal service life.

The work accomplished by this company is far more difficult than the original finishing operations on the cylinders. The original manufacturer can cast, grind and hone to size, then call it a job well done. The cylinders that arrive for re-finishing in the Spar-Tan shops always contain bore ring steps, and quite often are worn to a taper or are out of round. They may have been previously plated with chromium, and this old coating must be removed before the refinishing work can start.

Backbone of the Spar-Tan operations is the patented "Porus-Krome" process. This is a modification of the conventional hard chrome plating process wherein a final etch of the plated product in a "reversing" tank creates numerous small pores in the plated chromium, thus overcoming the non-wettable properties of hard chrome and providing a surface of ideal character for absorbing oil and maintaining constant lubricating films.

The coating applied, like ordinary hard chrome plate, is dense, hard and

wear resistant. The natural high temperature resistance of chromium makes it ideal for use in combustion engine cylinder bores. The pores that are created in the etching tank do not extend more than ⅔ the distance through the plating, thus a continuous



Checking the I.D. of a cylinder during a pause in the honing operation. Honing stone holder can be seen at upper right. The cylinder holding fixture grips the cylinder at top and bottom, thus eliminating side pressure that might cause out-of-roundness to occur.

layer of chromium protects the underlying metal from corrosion caused by the products of combustion. Aside from the slightly modified plating solution and the use of a reversing tank, the chief requirements of the Porus-Krome process are extremely accurate control, timing of the plating and reversing currents to obtain the desired type of porosity in the plated surface.

Handling of the cylinders prior to and after plating follows a conventional pattern, though due to the tendency of plated chromium to exaggerate surface faults, great care and precision must be practiced all along the line. In this respect, many companies engaged in product re-finishing and reclamation can benefit from a knowledge of the Spar-Tan operations.

The majority of cylinders being refinished at this time are cylinders from railroad and stationary marine diesel engines, and cylinders from radial aircraft engines. These later must be refinished in accordance with CAA and Army and Navy Specifications, which in turn have been developed around the Porus-Krome process.

Several contingencies hover over each cylinder that enters the shops for reclamation. It may have been previously chrome plated and stripping of the old coating will be necessary before any re-finishing work is accomplished. In other cases, the cylinder may be worn beyond economical and practical reclamation. In this respect, 0.030-inch on the I.D. has been established as the maximum wear permissible. Heavier plated coatings would not only be overly costly, but plated chromium as applied in the Porus-Krome process tends to roughen beyond this thickness and top quality work would be difficult or impossible.

The stripping process used for the removal of old chromium deposits is conventional. Temperature of the stripping solution is controlled by an automatic relay in conjunction with an electric heating coil. For cooling purposes, a lead coil pipe with running water is permanently installed below solution level. After stripping, the cylinders are thoroughly rinsed, and are

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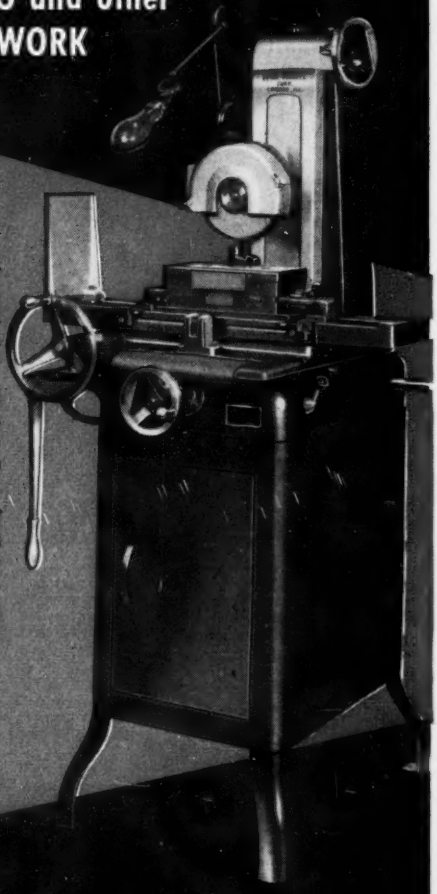
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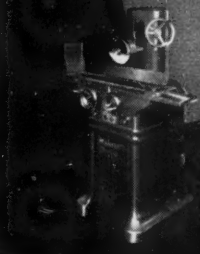
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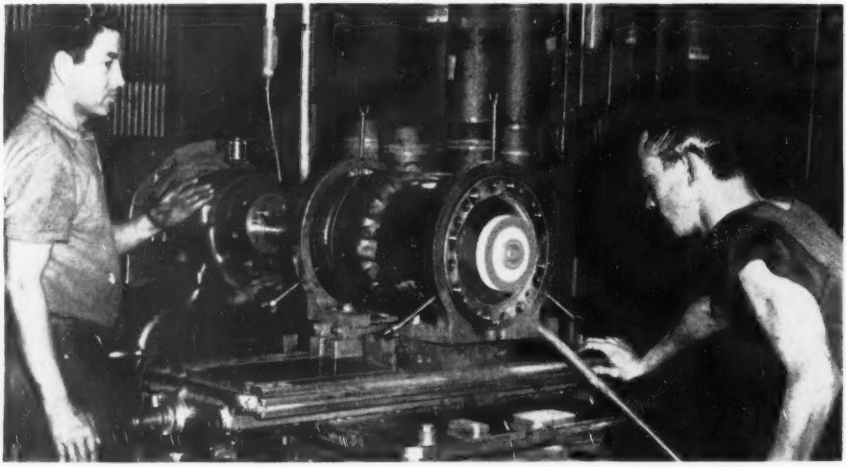
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then ready for the honing operation.

Honing is a critical operation. Plated chromium tends to exaggerate rather than improve any defects of the surface on which it is deposited. Thus the finish obtained in the cylinder bore during the honing operation will be representative of the final finish after the chromium has been plated on.

so that after honing the I.D. dimension before plating is within a 0.0005-inch tolerance.

To assist in the honing operation, a special cylinder holding fixture was designed and built by Spar-Tan Company engineers. This fixture, pneumatically operated, grips the cylinder at each end rather than around the out-



Heald grinder used to grind a slight taper at each end of the cylinder to facilitate piston ring installation. The same machine is used to grind relief (a slight enlargement of the I.D.) in the port area. Here an end taper is being ground. Cylinder remains stationary while the grinding head reciprocates around the inside periphery.

A Barnes Drill Company specially-built honing machine is used. The grit or stones employed depend upon the metal of which the cylinder is made, amount of metal to be removed, defects to be corrected, and whether initial of final-finish honing is being done.

All cylinders that have been used exhibit a "ring step," or slight ridge of metal where the top piston ring comes to a stop during engine operation. Others may be worn to a taper; others will be out-of-round. Regardless of the defect, each must be corrected

side diameter. This permits easy loading and unloading, offers nothing to interfere with the up-and-down sweep of the hone, and eliminates "squeezing" of the cylinder from outside which might cause some out-of-roundness to occur.

After honing, the diesel cylinders travel to a No. 50 Heald Grinder, used to put relief in the port area and a slight taper on both ends. Relief in the port area is a slight enlargement of the I.D. across the ports, while the end taper is necessary for the subse-

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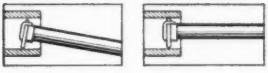
Sapphire tipped gaging plunger and chrome-plated centering-size discs insure a long, trouble-free gaging life.

NEW #00 uses centering-size discs for checking bores from 1/4" to 3/8"

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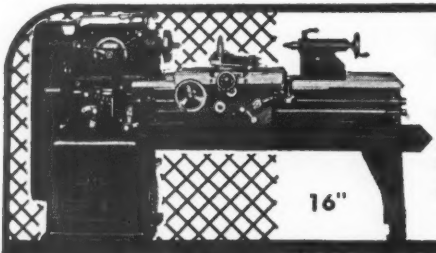
"Breaking" the port edges with a small hand grinder to offset edge build-up tendencies of the chromium plating process. This cylinder holding fixture was designed by Spar-Tan engineers. The cylinder is placed in the fixture at floor level, then it is raised along the curving tracks to working position.

quent installation of piston and rings. In the next step, a small hand-operated grinding wheel is used to break down the port edges to offset the customary build-up of electrodeposited chromium along edge areas.

The ports in a diesel cylinder are merely small, square perforations entirely through the cylinder jacket and opening into the bore. After the port edges have been "broken" with the hand grinder, a masking compound is applied in the port and flush with the bore of the cylinder. This permits the plating current to enter only from the bore side which again aids in preventing edge build-up.

After preparation and masking of the port areas, the cylinder is hand-burnished. While this burnishing aids somewhat in increasing surface smoothness, its greatest benefit is to provide better contact between the cylinder and the holding fixture used to carry the plating current. This current varies between 500 and 3000 amperes per cylinder, therefore good contact is extremely important.

After burnishing, the cylinder is mounted in a special plating fixture and the anode is installed. Due to the peculiar throwing power of a chrom-



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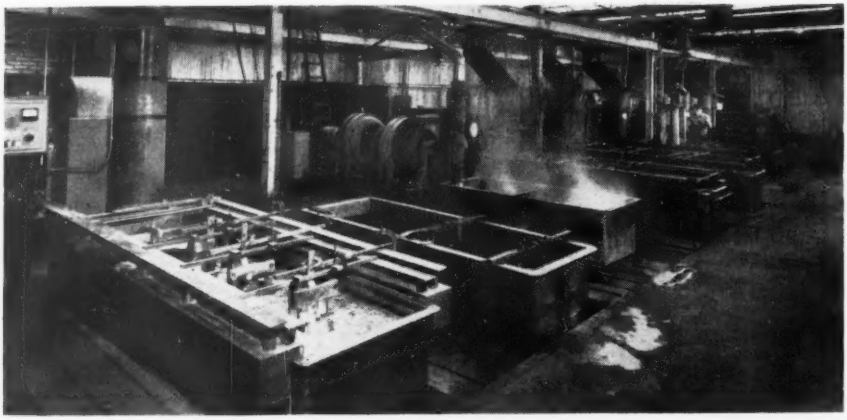
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General view of the Spar-Tan chromium plating department, including stripping, cleaning, plating and reversing tanks. Note huge motor-generator set in background. Plating current is generated in the company's own shop.

ium plating solution, which fades rapidly with distance, these anodes must be accurately centered in the cylinder to within a few thousandths of an inch. An off-center anode would result in unequal deposits around the

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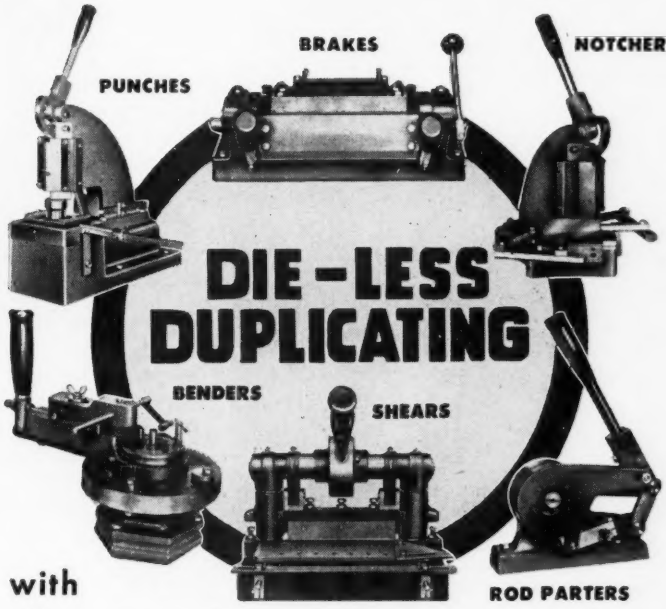
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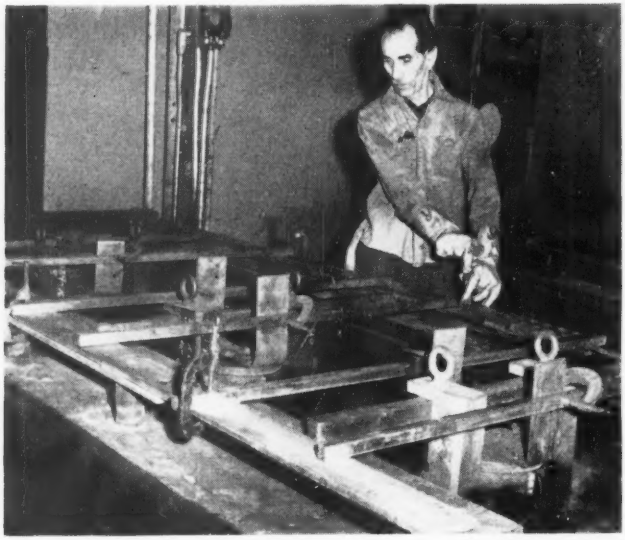
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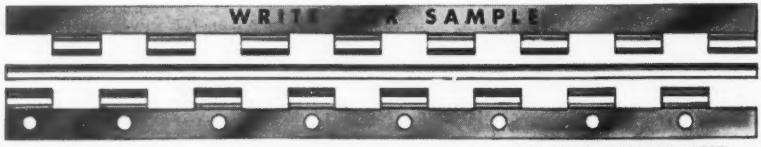
Close-up of chromium plating tank in action. Three cylinders are being plated. More than 6000 amperes of current are flowing through the bus bars. Note heavy clamps for assuring good contact between holding fixtures and bus bars.

periphery of the cylinder and unequal porosity in the finished coating. At this point the cylinders are ready for the plating bath.

The plating department at Spar-Tan Engineering Company has been laid out and equipped to obtain the extreme accuracy of control necessary for application of the Porus-Krome process. Eight tanks are in use containing the various plating, stripping, rinsing, and reverse bath solutions. Two large motor-generator sets and 11 rectifier units provide about 4 million ampere-hours of current a month for operation. Material is handled into and out of the tanks by means of an overhead traveling crane. When it is required, each tank is equipped with an automatic temperature control plus a recording chart for a permanent record.

George J. Moeller, Spar-Tan President and General Manager, points out that one critical control factor is to "hit" the proper degree of porosity and correct dimensions at the same time. Unless this is accomplished, the only alternative is to strip and start over.

"Two types of porosity are obtainable by using slightly different tech-



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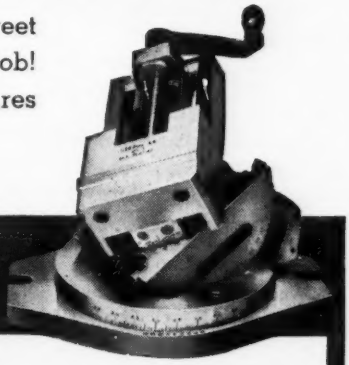
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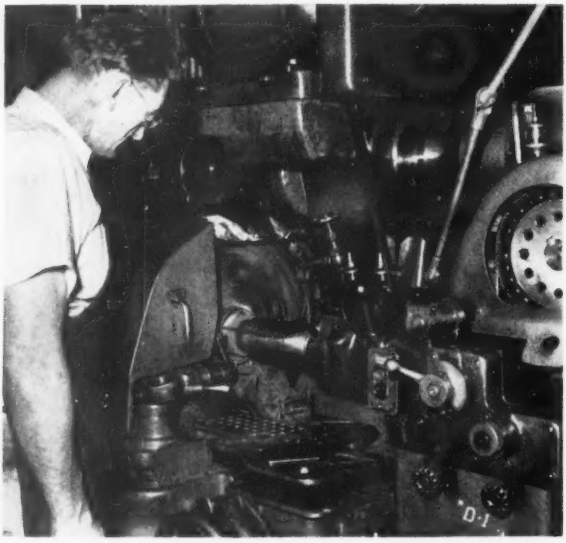
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Grinding the "choked" or tapered bore in an aircraft engine cylinder prior to plating. The machine is a Bryant No. 24-26 grinder. The cylinder rotates in one direction against the rotation of the grinding wheel. The grinding head follows a tapered guide during its in and out travel that conforms to the in-built taper of the cylinder bore.

niques," Moeller says. "One is the pocket-type porosity, and is employed in truck, bus, railroad, and marine engine cylinders. The other is the channel-type porosity used in replating the bore of radial aircraft engine cylinders. With either type, the surface provides an ideal medium for oil absorbtion under non-pressure conditions, such as the splash system used in an engine crankcase."

This porosity is obtained by an etching action. The chromium deposit in the first plating tank is very similar to that obtained in any hard chrome plating operation. But immediately after this original application, the cylinders are removed to the reversing tank and "struck hard" with a reverse current. The action is somewhat similar to stripping, but due to slight modification in the original deposit and to the character of the solution used in the reversing tank, the chromium is removed or "stripped" in small areas only, giving rise to creation of the pores. The controls applied at this time govern the type of pore produced. In the finished part, pore orifices will occupy from 20 to 50 per cent on the total plated surface.

After plating, the cylinders are re-

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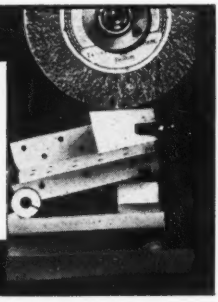
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turned for finish honing. No chromium is removed during this operation. The main action of the stone is to smooth the plateaus between the pore orifices. The same applies when the cylinder travels to the Heald grinder for final



Dipping an aircraft engine cylinder in hot wax. The wax coating protects the aluminum cooling fins from the acids in the plating and reversing tanks. It is melted off in a hot water dip after plating is completed.

preparation of the port relief area and end tapers. A different grit is used than in preplating grinding, and less pressure is applied on both the hone and the grinding wheels.

Final preparation of the plated cylinder bore is accomplished in a Pangborn Hydro-Finish machine. This machine is entirely automatic in that cyl-

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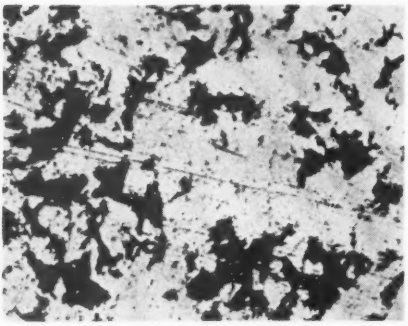
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Microphotograph (50 magnifications) of channel type porosity used in plating aircraft engine cylinders.

inders are merely placed on a conveyor, and are then automatically handled through the machine and out again after cleaning.

While in the Pangborn, the cylinder bore is subjected to pressure spray by a grit-liquid mixture. This serves two purposes. The grit provides a final satin-smooth surface on the chromium which aids in breaking in the piston rings after the piston has been installed. The liquid washes the last traces of honing and grinding debris from the pores so oil can penetrate freely. After the cylinders leave the Pangborn unit, they are run through a conventional alkaline cleaning tank, then dipped in a tank of rust preventive oil and are ready for shipment.

Re-finishing of the radial aircraft engine cylinders follows closely in pattern the techniques used in re-finishing the diesel cylinders. However, as these cylinder bores incorporate a "choke" or taper, a special grinder, in this case a Bryant No. 24-26, must be used to prepare them for plating. Honing stones used in the aircraft cylinders are mounted on cork to provide flexibility for this taper.

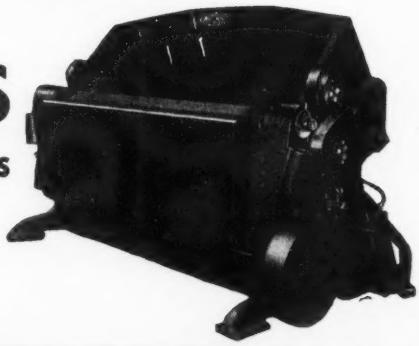
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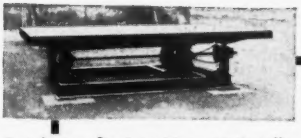
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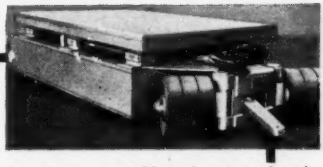
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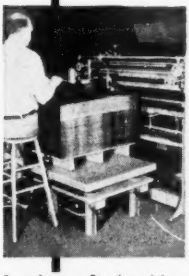
Portelvator; fixed position; pit installation for positioning truck and trailer beds to loading platform.

Portelvator; portable, elevating, tilt top; to facilitate removal and emplacement of bus motors.





Portelvator; portable, elevating; for the movement and positioning of automobile body dies.



Portelvator; fixed position, automatic, self-leveling; for sheet feeding operation.



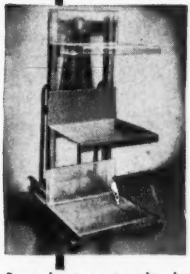
Portelvator; fixed position; pit installation for "below and above floor level" operation; sheet feeding.



Portelvator; standard style "A"; capacity, 2000 pounds; lift, 15".



Portelvator; fixed position; basement installation for extra high lift from ground floor.



Portelvator; standard style "S"; capacity, 1000 pounds; lift, 52".



Portelvator; fixed position, roller top, elevating, die transfer table; self-loading and self-discharging; capacity, 25 tons.



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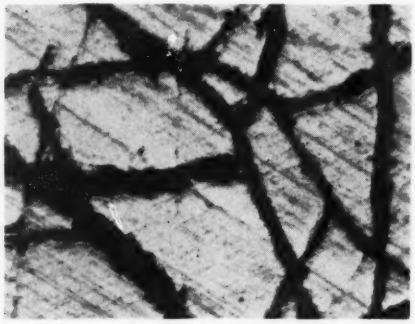


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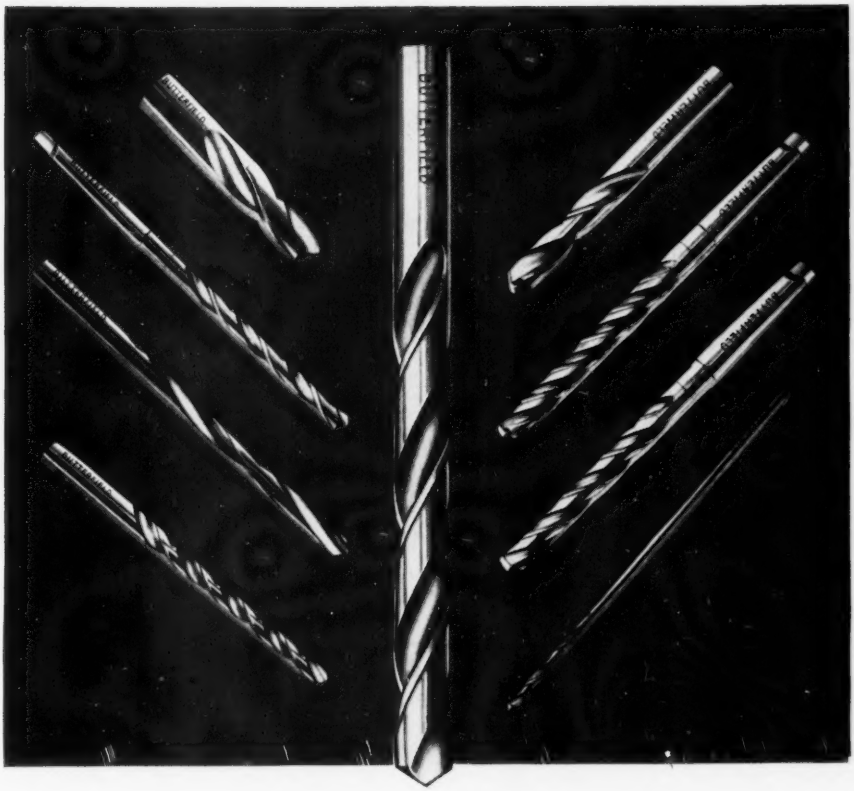
The aluminum cooling fins on the aircraft cylinders must also be masked off as they would be attacked by the plating solution. This is accomplished by dipping them in hot wax. "A wax used for such a purpose must exhibit several characteristics," Moeller says. "It must cover and adhere well, it must resist electrical breakdown, it must be resistant to the plating and reversing solutions (composed largely of chromic acid), and it must be easy to remove."



Microphotograph (50 magnifications) of pocket type porosity used in plating diesel engine cylinders.

Concurrent with their present activity in reclaiming worn engine cylinders of all types, Spar-Tan Engineering Company is planning plant-wide expansion to add a new patented process to the one already in use. This will be a new process for plating pure iron.

"This will round out our activities and permit us to give better service to our customers," Moeller points out. "Right now we are limited to reclaiming cylinders with maximum wear not exceeding 0.030-inch. When we are equipped the plate iron as an underlay for the Porus-Krome coating, we will be able to build up any wear, regardless of the amount."



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MACHINING MAGNESIUM



Neat, orderly factory work areas are essential to safety as well as efficiency in the fabrication of magnesium and its alloys.

Concluding discussion on the unique properties of magnesium together with recommended methods of machining this material

By Frank Charity

High-speed steel or cemented carbide counterbores for use on magnesium are ground similar to end mills. Margins are small with adequate relief and clearance angles to eliminate rubbing and provide adequate chip space. Sharp interior corners which cause stress concentration are avoided by having counterbores with rounded corners at the ends of the cutting edges. Corner radii average $\frac{1}{16}$ in. or more, depending on the diameter of the cutter.

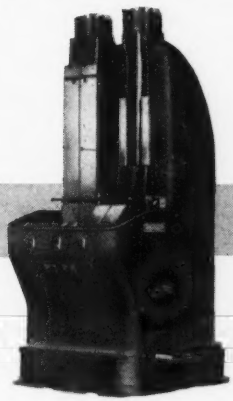
Sawing

Magnesium is very readily cut with band or circular saws as well as with hand or power hack saws; and due to low cutting pressures, larger cuts can be taken per tooth than are possible with other metals. This necessitates larger chip spaces to permit the saws to remain free-cutting. Too small a tooth pitch or chip space will cause the saw to ride over the work and rapidly dull the teeth. The set of the teeth is relatively large, and relief angles on circular saws are sufficient to minimize friction. Special teeth profiles, developed to give better cutting action to circular saws, work very well and the best quality saws are used to obtain good service life.

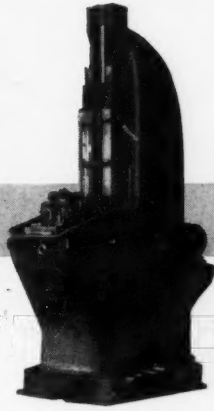
Sawing feeds are best determined by

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surface broaching for difficult machine work

the requirements of the particular job and the type of sawing machine being used. A rough estimate of the allowable feeds is based on the fact that magnesium requires only 1/10 the power required to saw steel. Feeds up to 120 inches per minute are used when sawing magnesium with circular saws.

Single and double cut files of the coarse, bastard, and second-cut types are likewise satisfactory. Smooth cut files load up readily, but can produce a fine finish if light cutting pressures are used. Single cut coarse files with from 5 to 10 teeth per inch and back rake angles of approximately 10 deg. are used for heavy work where an appreciable amount of metal must be removed.



Magnesium alloy materials are cleaned, degreased, and so on, before and after they are machine-fabricated with the same types of equipment that are normally used in processing steel and aluminum alloys.

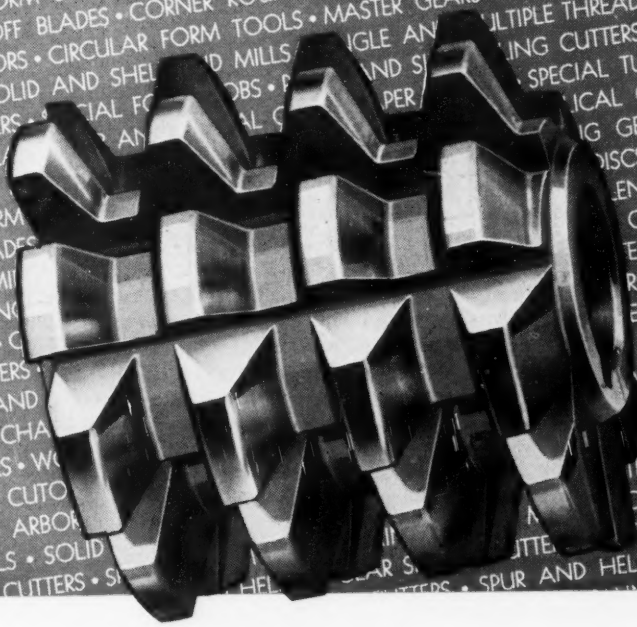
Filing

Rotary files or burrs provide excellent tools for casting clean-up and filing of irregular surfaces. Best results are obtained from high-speed steel burrs which are coarse-cut with few cutting edges and deep flutes for good chip clearance. Surface hardening treatments or chrome plating give increased abrasion resistance and longer tool life. These tools are operated at 4500 to 7000 r.p.m., depending upon the burr size.

Grinding

The finish grinding of magnesium alloys is usually unnecessary inasmuch as finishing cuts can give extremely accurate and smooth surfaces, but rough grinding is widely used to remove flash from castings and forgings. The relative softness of magnesium necessitates a medium to coarse grained, medium-hard grinding wheel. A grain size of 20 to 40 is sufficient

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Table IV

TYPICAL METHODS OF POLISHING MAGNESIUM ALLOYS

Operation	Abrasive	Wheel Type	Wheel Dia., In.	Speed, fpm
Rough Polish*	60 to 100	Canvas, Sheepskin, or Felt	6 to 12	3000 to 5000
Medium Polish**	100 to 200	Builtup Cloth	6 to 12	4000 to 6000
Dry Fine Polish	Dry	Loose Buff	6 to 12	3500 to 5000
Buffing	Tripoli	Loose Buff	10 to 14	6000 to 8000
Coloring***	Dry Lime	Canton Flan'l	12 to 16	8000 to 12000

*Used sometimes with grease stick; for rough casting surfaces, and so on.
**Grease stick may also be used.
***Minimum pressure yields best lustre.

for rough grinding, while 40 to 70 is satisfactory for most finish grinding. The coarsest grain possible is preferred to avoid loading of the wheels and provide rapid free-cutting. An open structure in the range of 4 to 8 reduces loading.

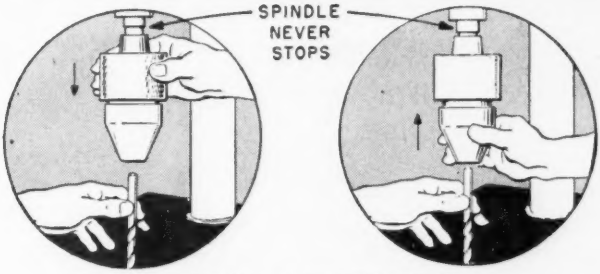
Polished surfaces of any desired quality are very easily produced on magnesium. Surface irregularities are readily removed and high-luster finishes (on articles to be plated or used for decorative purposes) are produced by appropriate buffing. Table IV lists recommended procedures for polishing and buffing magnesium.

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THIS view of an operation involving ultra-precise inspection of dimensions, tolerances, and other engineering details during production of metal stampings at the Toledo, Ohio, plant of City Auto Stamping Company reveals some unusual and interesting facts regarding the layout plate employed for that purpose. The equipment consists of a single block of granite which is cut with an overhanging ledge, measures 192 x 96 x 32 inches, and weighs 50,000 lb. in finished form. The extremely hard surface of the plate is lapped to 0.002-inch overall flatness and is provided with 20 drilled holes which are 2 inches deep, each hole being fitted with metal lugs threaded to ½-inch diameter in order to firmly secure objects during test operations.



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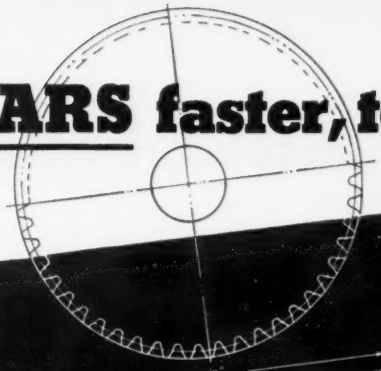
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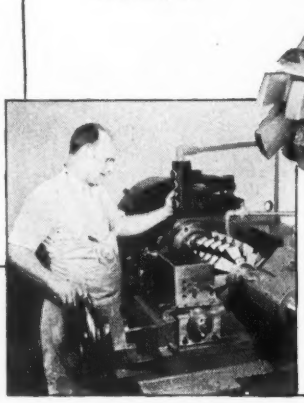
If your plant is cutting gears, you will find this Barber-Colman service the easiest, most direct and efficient approach to control of your gear quality problems. Write today for recommendations on your jobs.

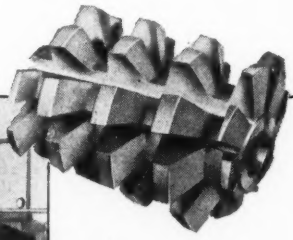


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To 268 DP Unground
To 200 DP Ground

Barber-Colman fine pitch hobs were introduced for production use in 1936. Today, they are the finest hobs made in the extremely fine pitch class for instrument, fuse, meter and watch gears.





Coarse Pitches

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From 1½ DP Ground

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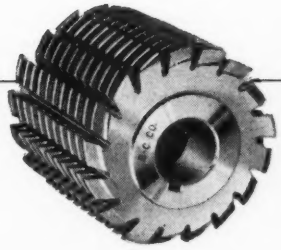
D E S I G N E R S O F S T A N D A R D A N D S P E C I A L

FOR EVERY ONE OF YOUR GEAR REQUIREMENTS

ULTRA-PRECISION HOBS

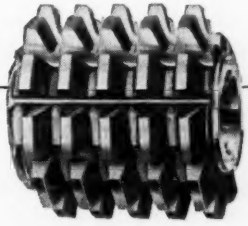
Barber-Colman engineers are now able to announce another development in gear accuracy. For a number of years we have been making a precision ground hob known as Ultra-Precision, to meet the tooth profile tolerances demanded for extreme quietness, smoothness and constant rate of rotation. These hobs are recommended where machine and tooling conditions are consistent with the use of such a fine tool.

Take a close look at your gear requirements and see whether you are taking full advantage of all the refinements available with Barber-Colman gear hobs and gear hobbing machines. Ask one of our field engineers to call and discuss your gear problems, or send blueprints showing the tolerances required. There's a hob in this complete line to take care of your requirements.



Multithreads

Barber-Colman Multithreads are designed especially for high production requirements, and can be furnished with either ground or unground form.



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Ultra-Precision Ground
Class A Precision Ground
Class B Commercial Ground

Unground Classes

Class C Accurate Unground
Class D Commercial Unground

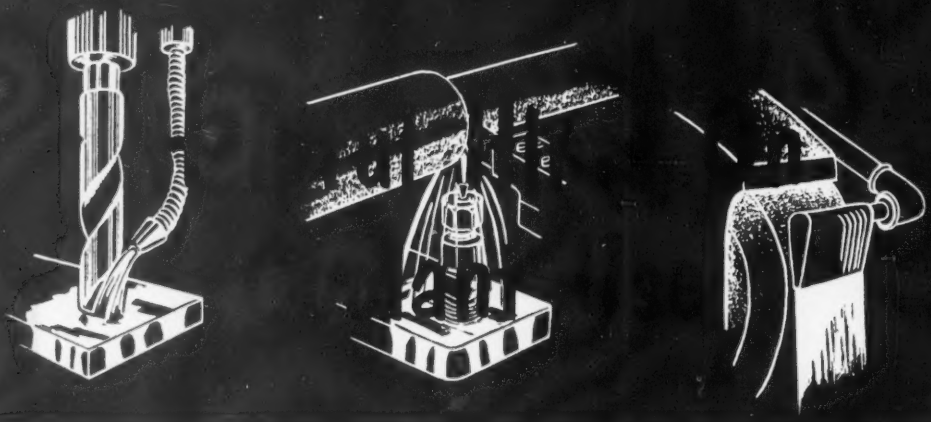
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METAL CUTTING TOOLS SINCE 1908



Data on coolant fed tools and accessories with particular emphasis on the use of coolants in drilling operations

By John E. Hyler

PROPER application of coolant to end-working tools poses a definitely different mechanical problem than the application of coolant to "open" cuts. However, the proposition of actually getting coolant to the cutting edge or edges is still the important one. Drills are an interesting study in this respect. Non-rotating drills, as used in screw machines and turret lathes, should have coolant applied to them in such manner that the coolant pipe has its axis quite closely parallel to that of the drill. Thus, the coolant is being directed almost squarely at and into the hole being drilled. Moreover, the flow of coolant should be adjusted directly into the flute of the drill as much as possible, giving it a better chance to penetrate.

What has been said about fast intermittent heating and cooling of tool edges due to intermittent interference of fast-forming chip, applies with full force to drills, especially where a drill is being used in a horizontal position, as on the screw machine or the turret lathe. One should avoid flooding a hot drill with lubricant immediately upon withdrawing it from the hole. On the same basis, a drill point hot from grinding should not be immediately plunged into water. Too-sudden cooling of a very hot drill will produce fine checks or cracks in the steel which definitely weaken the tool.

Where any ordinary drill is being used in a horizontal position, it is much more difficult to get coolant to the point of it than to the point of a vertical drill. The deeper the horizontal-axis hole, the greater the difficulty. Unless special measures are taken which prove adequate to keep the drill reasonably cool, one will find that a spindle speed suitable for drilling relatively shallow horizontal holes may be entirely too fast for drilling deeper ones, because the point of the drill is not getting enough lubricant.

Two Coolant Streams

Whenever it is found possible to do so, it is better to have a dual coolant flow arranged for a screw-machine or turret-lathe drill, with one flow being directed along the top of the drill and the other along the bottom. In some cases, a weir may be arranged to change the direction of coolant flow enough to give it a better hole-penetrating effect, and to reduce or eliminate splashing. One should always seek, as far as possible, to avoid having coolant strike any surface with sufficient impactual force to cause any unnecessary splashing. In addition to the messiness of undue splashing, and to the waste of coolant attendant upon it, it is always true that the coolant that splashes off does no cooling.

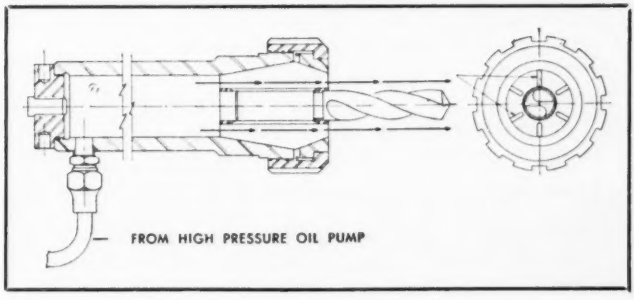
There are other cases where a dual-flow arrangement of coolant to a cutter is of definitely beneficial effect. One of these is found in heavy slab milling, where special width-distributing nozzles can be used in pairs to fan the coolant out over the full surface of the work and the cutter on the areas immediately in front of and behind the cutter. A somewhat similar arrangement, so far as using nozzles both before and behind is concerned, is definitely worth while on many surface grinding operations.

Mechanical aids to better application of coolant have been devised by some machine and tool builders which have greatly increased efficiency in various cases. Built-in coolant systems are provided on many modern screw machines and have simplified the problem of properly bringing fluid to various cutting edges.

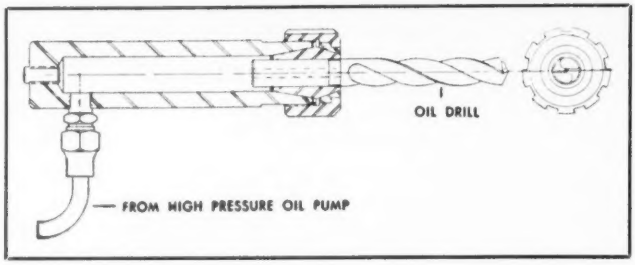
In screw-machine drilling, noteworthy coolant-fed chucks for drills have been put into use in many places, especially on workpieces where it is necessary to do deep-hole drilling. The special collets in the drill-holding body of such tools have six slots. These six slots are uniformly spaced angularly, and directly around the drill. Coolant is forced through and from these slots under pressure, along the drill and against the face of the workpiece. This method has, in many cases, replaced the practice of purchasing special oil-hole drills, which are of necessity expensive.

Oil-Hole Drills

Use of oil-hole drills may always be resorted to, however, in any case where it is found impossible to get sufficient coolant to the cutting lips of a horizontal drill in any other manner. They are used for deep-hole drilling in screw machines, where the drill is non-revolving, and are available in both



▲ Using a standard drill, one type of collet-fed chuck embodies a slotted collet member, through the slots of which oil is forced against the face of the work by means of a high pressure oil pump.



Using an oil drill in a coolant fed chuck, the oil is forced directly through holes in the drill to the cutting edge.

straight-shank and taper-shank types.

The oil holes run through the entire body and shank of the drill. A pipe connection to the holes is provided, which may be either plain or threaded. This coolant connection may be at the shank end of the drill. However, oil-hole drills are also supplied with so-called side or neck connections when so specified. Where coolant is forced directly through holes in the drill to its cutting edges, the coolant pressure which builds up aids greatly in forcing the chips back out of the hole being drilled.

Horizontal reamers can be and sometimes are provided with a fluid passage through them, so coolant can be forced through them to lubricate the cut in much the same manner as where coolant is forced through oil-hole drills. With a reamer, however, it is not so often done. When it is, a single axial

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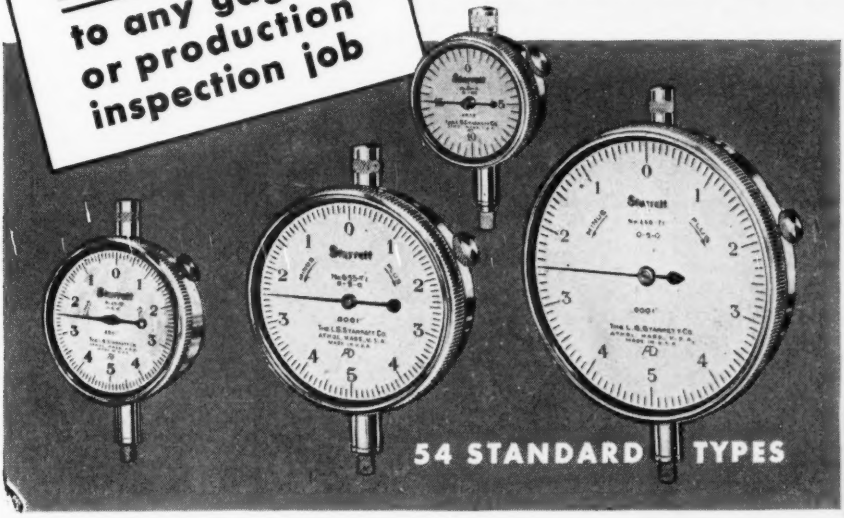
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hole is used. If a blind hole is being reamed, forced-in coolant will force the cuttings back out of the hole through the reamer flutes, in much the same way as it flushes drill chips from a hole being drilled. Other end-working tools for use in holes may be similarly arranged if and when the need appears.

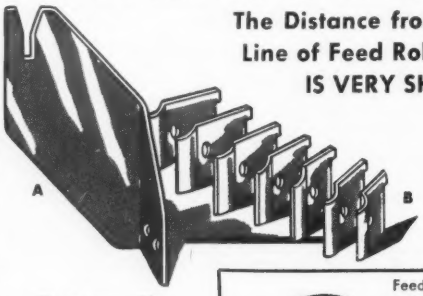
Coolant Retainers

Where a through-hole already exists in a workpiece, the problem is somewhat complicated. In other cases, however, special coolant retainers are used against which the workpieces bear at the rear. These retainers prevent most of the coolant from passing on through the hole, and thus provide much of the force-back effect obtained when working blind holes. In some cases where workpieces are too rough to allow use of retainers to advantage, and especially in the case of cored holes through castings, coolant may be and is run through the machine spindle. In this way it may be driven into the hole in the work with enough force to keep all cutting edges fully submerged, and to force cuttings back out of the hole as they are formed.

Drills used in drill presses, and so on, held with their axis vertical and revolved, have in many places been arranged and driven so that coolant can get down to their cutting lips by gravity, in a manner not possible years ago. This is accomplished through use of an auxiliary

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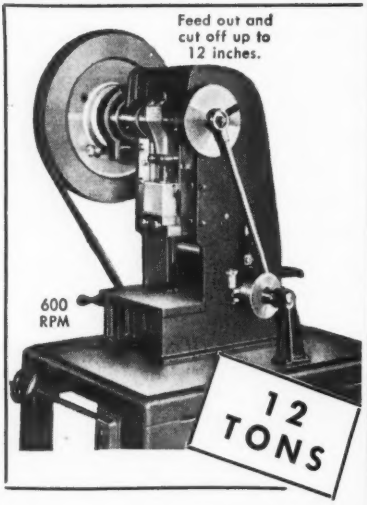
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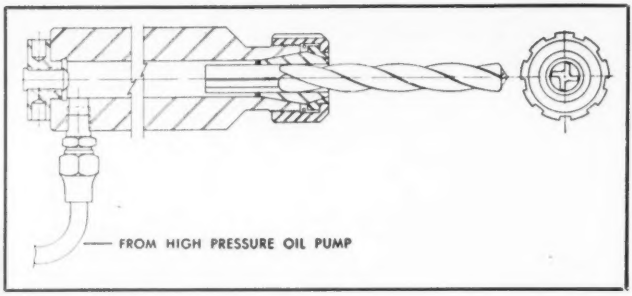
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A four-fluted drill may be held in chuck of proper design, and flats provided on the drill shank to allow oil under pressure to flow through the flutes, washing the chips from the drilled hole.

device known as a drill chip breaker.

The drill chip breaker is held in the drill chuck and in turn holds the drill. Its design is such that it imparts a slight reciprocating action to the drill at specific intervals, first lifting the drill a trifle axially, and then advancing it again to the cut. The result is that the drill chips are all broken into short pieces. In addition, as the drill is lifted slightly now and again, coolant is allowed to find its way to the bottom of the hole, cooling and lubricating the cutting lips of the drill.

Arresting Capillary Action

Many operators making use of drill jigs have found it difficult to keep a drill reasonably cool, regardless of the fact that plenty of coolant is being used. One of the main reasons for this

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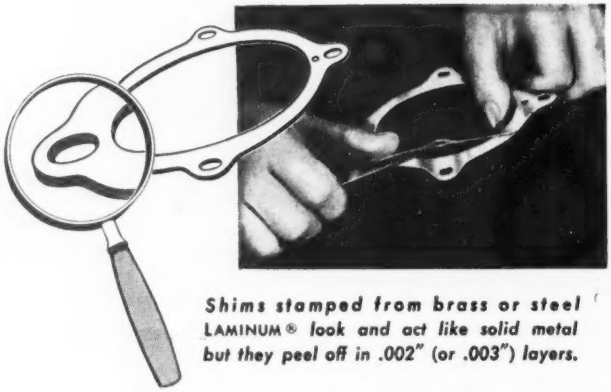
is that capillary action is set up between the lower surface of the jig and the top surface of the work, leading a considerable amount of the coolant away from the drill. This action is augmented, or at least is given a good start, by the centrifugal action of the drill.

One of the best cures for such a condition is to counterbore the under side of the drill jig, concentric with the hole to be drilled, the counterbore having a diameter substantially greater than the O. D. of the drill bushing. Thus, when the drill bushing is anchored in place, the end of it will come down flat on the work as before, but the end of the bushing will have an annular channel all the way around it. In this way, coolant will travel only to the O. D. of the bushing for at that point capillary attraction will be broken. The annular channel need be only about $\frac{3}{16}$ in. wide, and $\frac{1}{8}$ in. deep or a little more, to be effective.

While cutting oils have their place, and while the new chemically-reactive coolants are broadly applicable, an occasional instance is found where something definitely removed from either of these will work well as a coolant. A case in point is the use of turpentine as a coolant when drilling glass with carbide-tipped drills. Turpentine is useful where powdery chips are being produced that would gum

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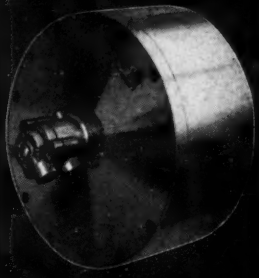
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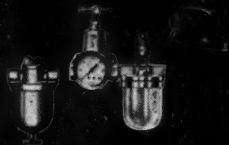
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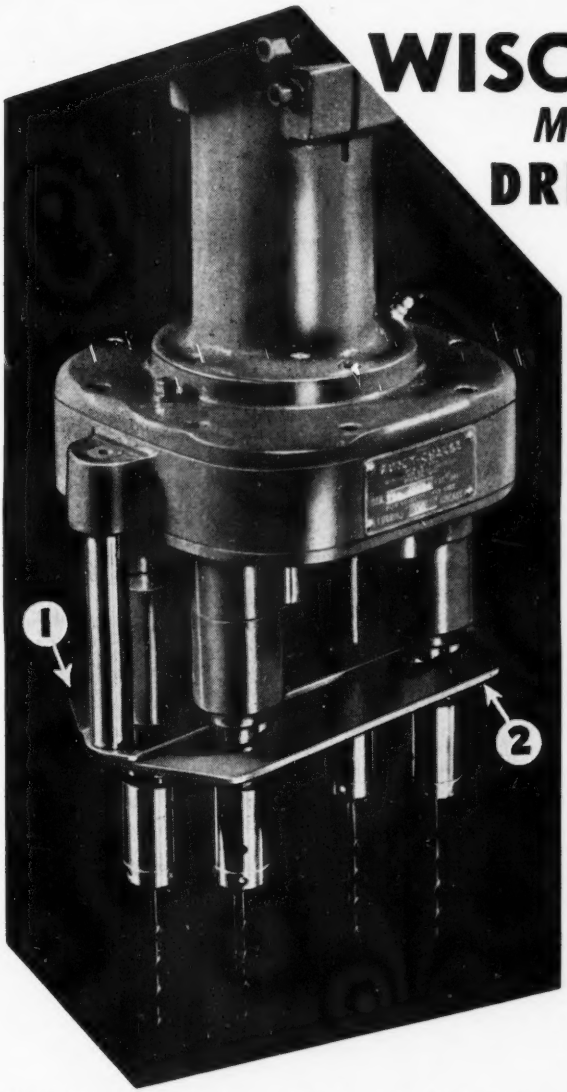
and pack under use of a conventional coolant. Kerosene is also useful under such conditions. It may be noted further that while coolant is in the vast majority of cases a liquid, compressed air is quite often used in drilling cast iron and other brittle materials, where liquids of any kind tend to pack the chips and cause them to glaze the material being cut.

Device Doubles on Coolant and Air

Generally, where compressed air is used as a coolant, a nozzle is employed which is suitable for compressed air only. However, an interesting device has been put into use in some places which may be employed for ready use of liquid coolant, or for the use of compressed air, or oil in cases where in view. The appliance is provided with a short supporting pedestal that can be attached to the machine with small machine screws. The "business" end of the device has a copper tube incorporated, ¼ in. diameter and about 2 inches in length, which may be bent to make the contrivance properly adaptable to the machine on which it is to be used.

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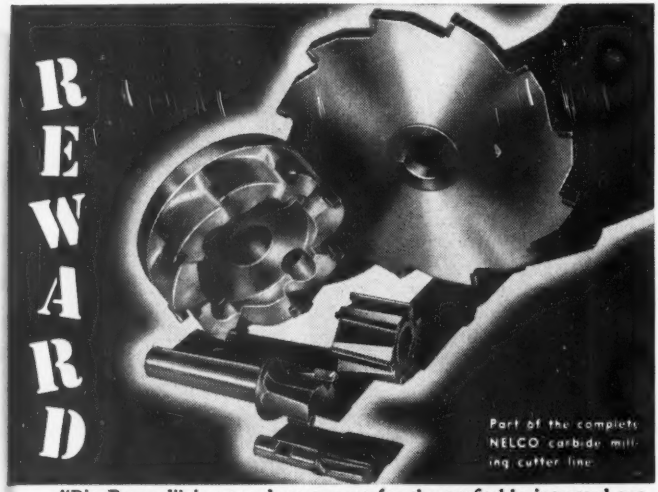
WISCONSIN DRILL HEAD CO.

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system can be attached, or an air-line connection, as desired. Thus, either liquid coolant or compressed air may be used for cooling as one desires. If and when desired, two units of this kind may be used together, one of which supplies lubricating oil and the other compressed air, to atomize the oil as it leaves the nozzle. With such a setup, punches and dies or other mechanical devices may be conveniently lubricated while in operation.

On all work where a thread-cutting die is being used, one should be sure to run the coolant directly through the die. This provides for washing the chips out of the die head, as well as for proper cooling. Roller turning tools should have their coolant flow arranged in such a way that it will not fail to lubricate and cool the rollers, as well as to cool the workpiece and cutting edge. The coolant pipe nozzle must be brought up just as close to a roller turning tool as possible without actually interfering.

The growth of bacteria in cutting oils, resulting a foul smell and in some instances in skin infections, is a proposition that has caused much trouble in some plants, but very little in others. Some machine operators seem predisposed to infections obtainable in this manner. Once an operator becomes infected, it is easy for



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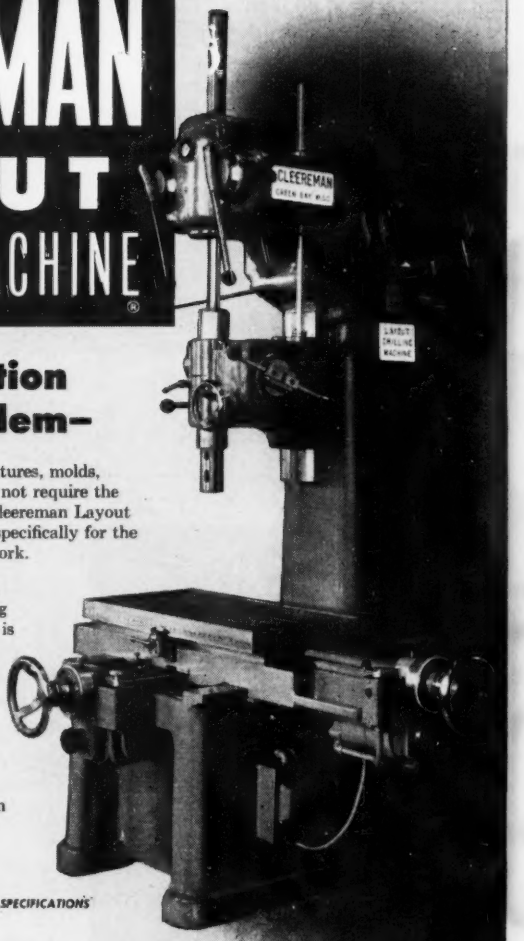
NELCO END MILLS reduce costs, increase efficiency. Bore and mill hole in one operation—without chatter. Often banishes finish cuts—retains edge longer—guarantees free and cool milling.

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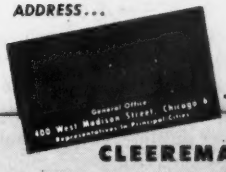
A large portion of tools, dies, jigs, fixtures, molds, jig-less production and other jobs do not require the ultra-precision of a Jig Borer. The Cleereman Layout Drilling Machine has been designed specifically for the efficient handling of this particular work.

Built with many features of design similar to those used in Cleereman Jig Borers, the Layout Drilling Machine is an economical machine capable of accurately locating, drilling, boring, reaming, tapping, etc., with the utmost of operator ease, at a fast rate of production over a long period of time.

Cleereman standards of high quality and proven engineering design and material selection have been maintained in every detail.

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BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

cutting oils in turn to become re-contaminated from the operator, thus initiating a viscious cycle.

Different germicides and fungicides have been provided and used to destroy and/or prevent occurrence of bacteria in cutting oils. Some of them have been found highly beneficial. It is also possible to sterilize cutting oils by heating them at intervals of two or three weeks, bringing them to a temperature of about 150 degrees F., and holding them there for 30 to 45 minutes. This is quite a troublesome process, however, and should be used only in case the trouble persists. In all such cases, operators should be given time out to wash up thoroughly once or twice extra during a working day, until the trouble has been fully eliminated.

It may be observed, in this connection, that some modern coolants which depend on chemical lubricity are not subject to rancidity, even in the hottest weather. This is definitely a point in their favor.

If and when coolant is heated to destroy bacteria as a matter of general practice, it is well to either filter or centrifuge it at the same time. Obviously, when cutting oils are brought to higher temperature for sterilizing them, they are made much thinner. In that state, they are much more amenable to proper filtering or centrifuging for removal of metal particles and other foreign matter.

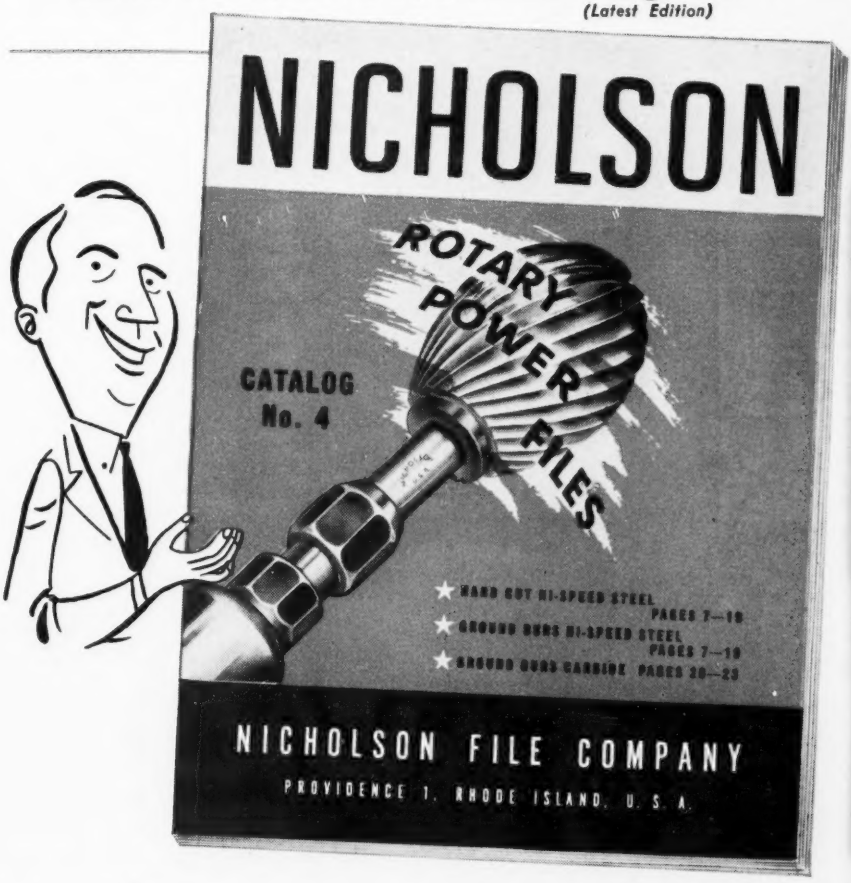


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BUILT for use in the aircraft industry by Clearing Machine Corp., Chicago, Ill., this huge double-action hydraulic press has a frame capacity of 1,500 tons, the punch slide delivering 1,000 tons and the blankholder slide 500 tons. The maximum stroke of the punch slide is 80 inches, and the press is arranged to draw and lift out a 30-inch piece. The bed is 96 x 162 inches. Three pressing speeds are available, in addition to quick advance and return. The press is driven by two 200 h.p. motors mounted on the crown. All controls are concentrated at one corner of the press, and all operating adjustments are effected from floor level, including individual control of pressure on each corner of the blankholder, as well as position of speed change or position of blankholder charging.

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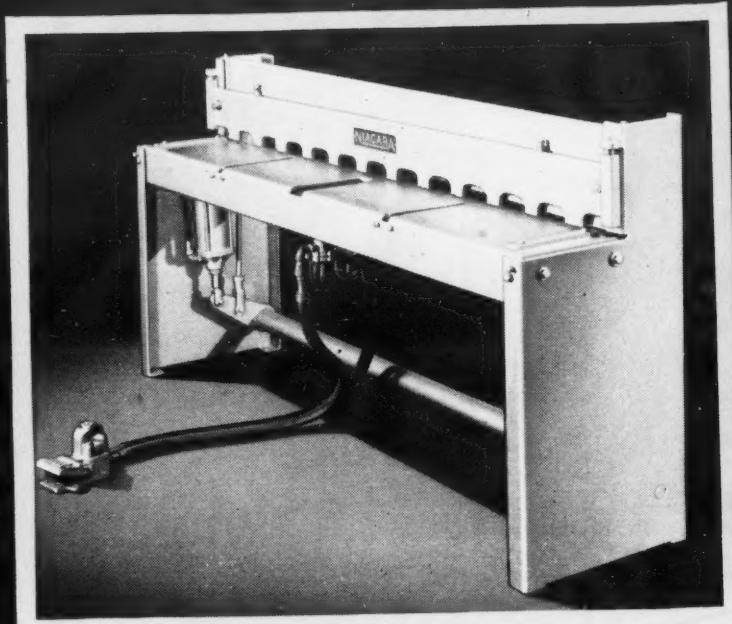
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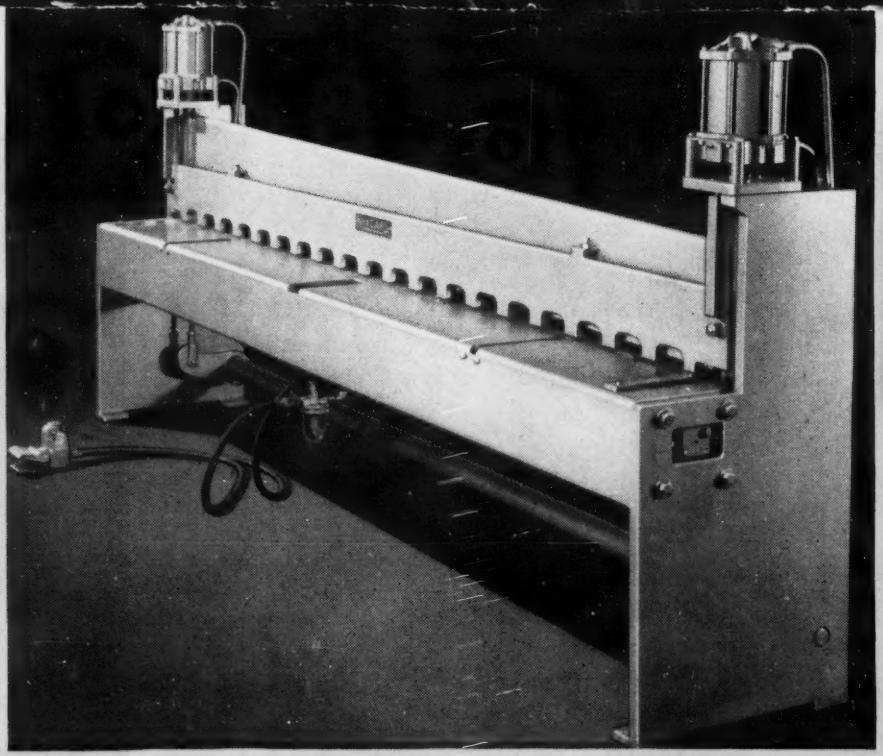
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Unusual Presses And Dies

Time and labor saving innovations which point to higher production and quality workmanship

By C. W. Hinman

BY utilizing the General Electric electronic system, the Verson All Steel Press Company of Chicago has built a press brake machine in which the ram may be held perfectly level throughout its stroke, or can be operated at a pre-selected degree of tilt down to a thousandth of an inch. This press brake design suggests that an endless number of angular bends can be produced in the workpiece without the necessity of designing and building special punches and dies.

The press brake is hydraulically operated. The ram is actuated by two independent hydraulic cylinders supplied by separately matched pumps. A reversible booster hydraulic pump is used to transfer oil from one line to another to maintain position synchronization for the ends of the ram.

The booster pump is driven by a motor supplied by an amplidyne generator which is controlled by the photoelectric system. The slightest tilt of the ram raises or lowers a barrier suspended between the photoelectric cell and the light source. Movement

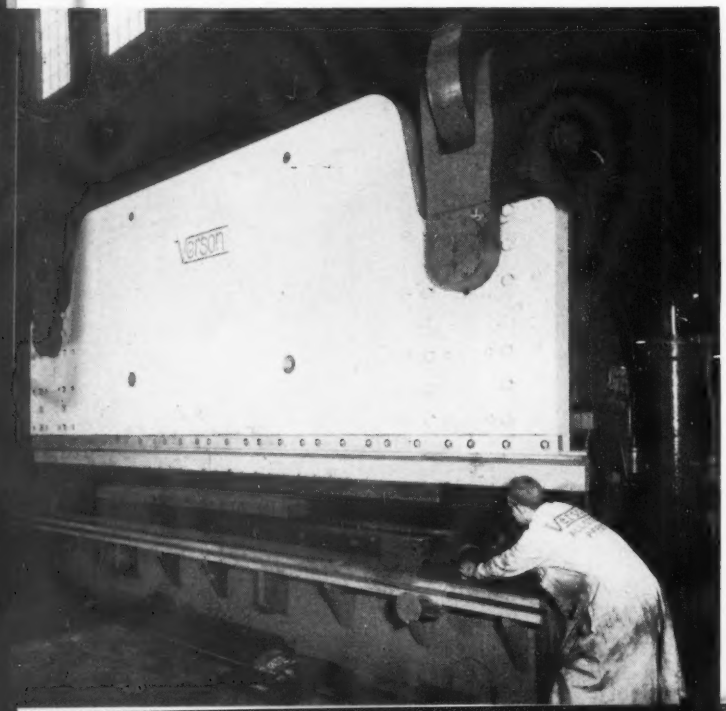


Fig. 1 — Illustration showing a 1,000-ton press brake equipped with electronic ram control.



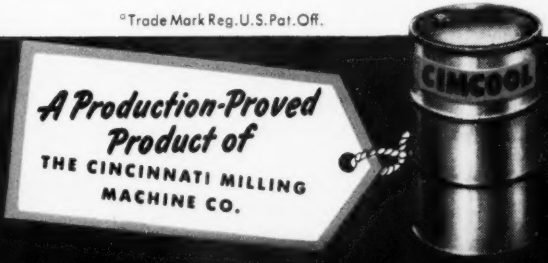
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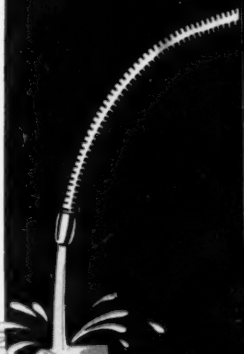
In city after city, clear across the nation, CIMCOOL° is winning enthusiastic approval for outstanding performance. And while doing a better job, this revolutionary cutting fluid—this *chemical* emulsion—saves you money three important ways:

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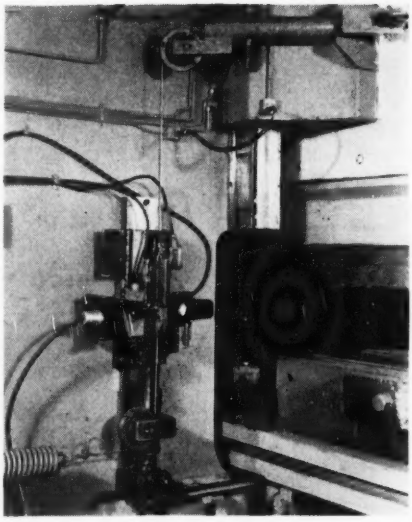
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for 85% OF ALL METAL CUTTING JOBS

Fig. 2—Closeup view of electronic mechanism which controls the ram motion of the press brake shown in Figure 1.



of this barrier only one thousandth of an inch results in automatic correction through altered speed and direction of the oil flow from the transfer pump. Fig. 1 shows a view of this 1,000-ton press brake, and Fig. 2 illustrates the electronic mechanism that controls the ram motions.

Shuttling Platen Saves Broaching Time

Accurately broaching two large separated holes perfectly in line, in forged steel steering knuckles for automobiles was solved by the manufacturer in conjunction with the Colonial Broach Company of Detroit. An ingenious tooling setup on a 15-ton, 48 inch pull-down broaching machine was used. Two workpieces were handled in one operation. A shuttling platen, hydraulically interlocked with the machine cycle, and an automatic locking and tilting fixture permit the operator to load and unload workpieces while the broaches are being re-

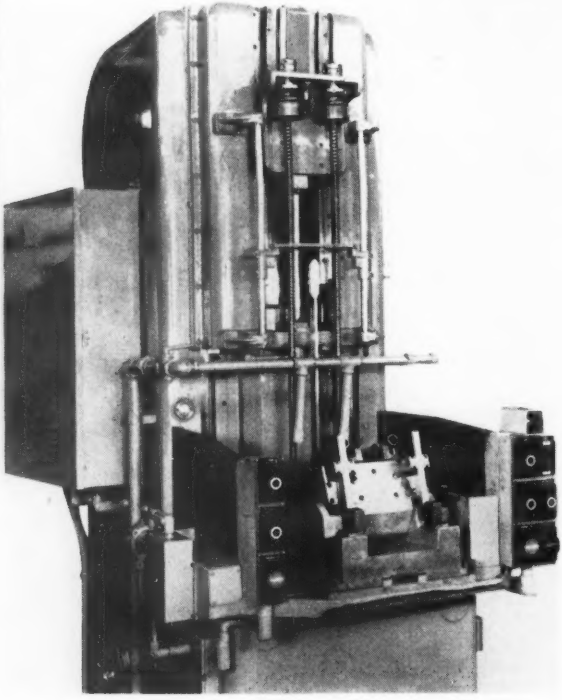
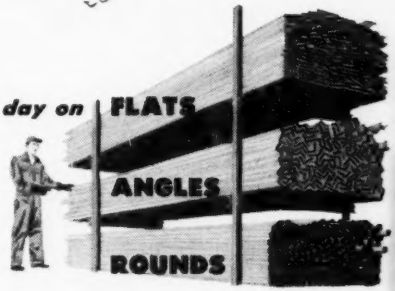
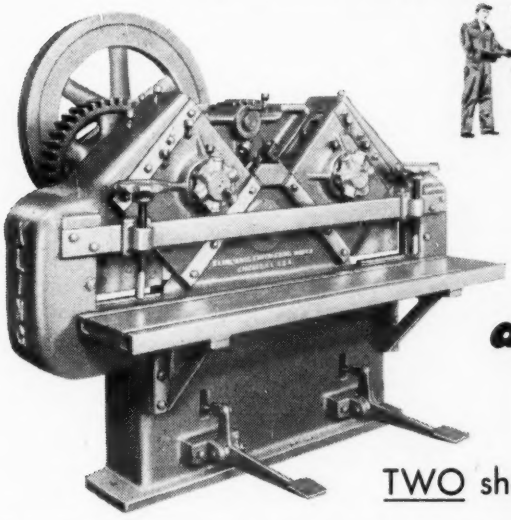


Fig. 3 — Illustration showing interesting tooling setup on 15-ton pull down broaching machine which is designed for broaching forged steel steering knuckles.

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Kling double angle shears

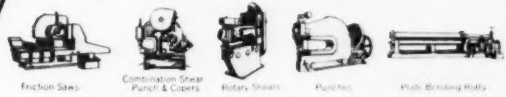
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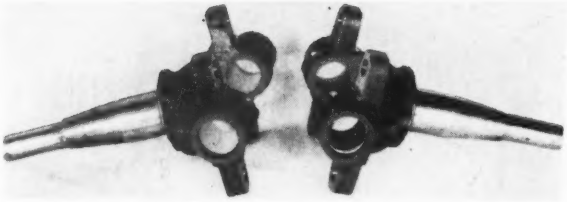


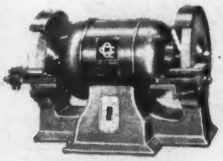
Fig. 4 — Rough forged steel steering knuckle is shown at right and broached workpiece at left.

turned to cutting position, thus eliminating the die time usually associated with this type of operation.

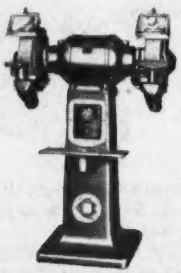
The fixture and broaches are shown in Fig. 3. Two rough-bored knuckles (Fig. 4, right) are dropped into the fixture, spindle down, the workpieces being located from the spindles and buttons on the lugs of the yoke. When the starter button is pushed, the trunnion swings downward and the platen shuttles into broaching position. As the broaches start downward to enter the rough bores, the rod shown between the broaches actuates a cam-operated expansion support between the arms of each knuckle, which prevents distortion of the work under the cutting load. The broaches then finish their cuts and the platen fixture returns to its normal loading position. The broaches then return to their starting position while the operator removes the finished parts (Fig. 4, left) and positions two more rough parts into the fixture.

Tubes and cans can be heated for a short distance around their end by means of an electronic application

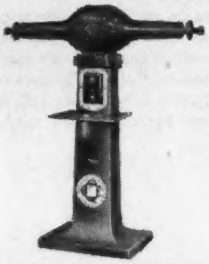
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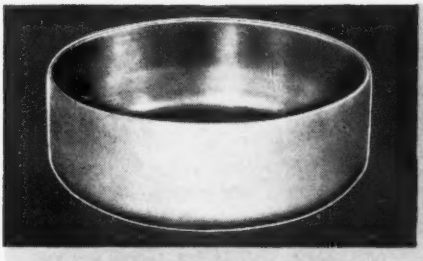


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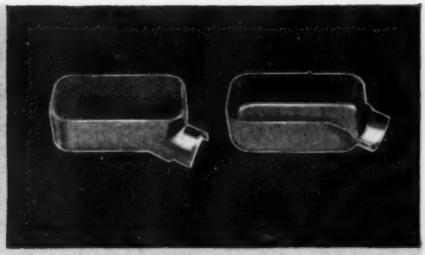
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Automobile defroster case (.0299 Al. Kiln Steel) made in 4 draws without annealing. One application of Johnson's No. 150 Wax Lubricant prior to 1st draw sufficient for all draws plus 3 blanking and trimming operations. Conventional lubricants caused tearing and required annealing before 5th draw.

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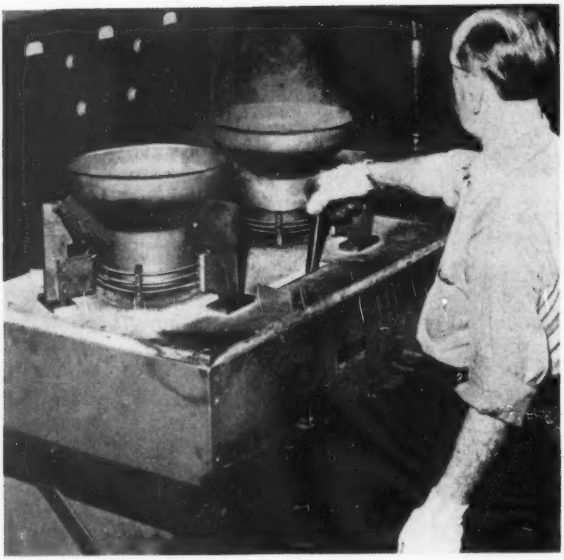


Fig. 5—Induction heating of milk can sections facilitates expanding and curling operations.

made available by the General Electric Company. The purpose is to anneal the end of the tube or can a short distance to facilitate expanding or curling operations. This idea has been adopted by the Buhl Mfg. Co., Detroit, where it is used for annealing milk can ends and has lessened manufacturing costs, and resulted in a more durable product. See Fig. 5. Formerly, the entire can had to be annealed in a gas-fired furnace when only the neck was to be bulged; then the entire can had to be pickled to remove the scale.

With the new method, it is possible to anneal as little as an inch of the neck of the can. The work can be brought up to the desired temperature in 12 seconds. Since the induction heating unit is equipped with a two-position transfer switch, one piece can be heated in one position while the other position is being unloaded and reloaded. At the end of the heating cycle, the power is transferred from one heating position to the other by means of a throw-over switch. The induction heating unit is located directly in the production line. As a result, one operator can anneal more cans with the present system than two men using the former method, which necessitated removing the cans from the produc-

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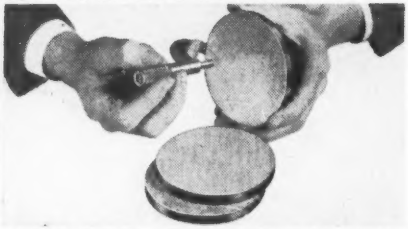
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tion line, moving them to the annealing furnace, pickling, and returning them to the line. This idea should work well in the manufacture of certain machine parts, ammunition shells, and when heating, forming or redrawing

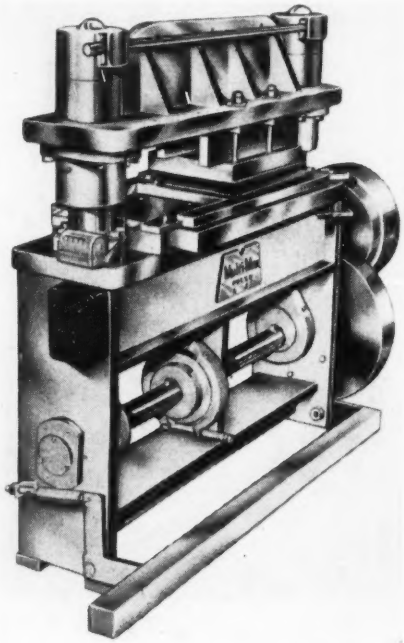


Fig. 6—Illustration showing press which is designed to handle extra-wide die sets on a comparatively narrow bed.

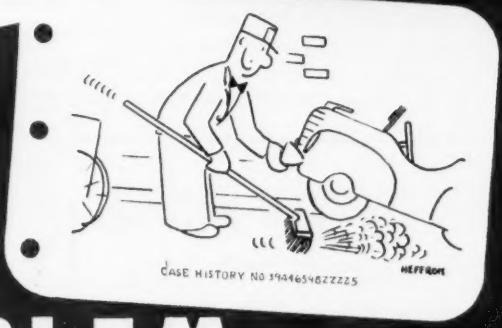
various metallic components. Electric annealing can, in many applications, double the output when compared to previously used methods.

Unusual Design of a Pull-down Press

Figure 6 illustrates the Multi-Max Press as designed and built by the Parker Manufacturing Company, Los Angeles, California. This press is intended to fabricate light metal parts

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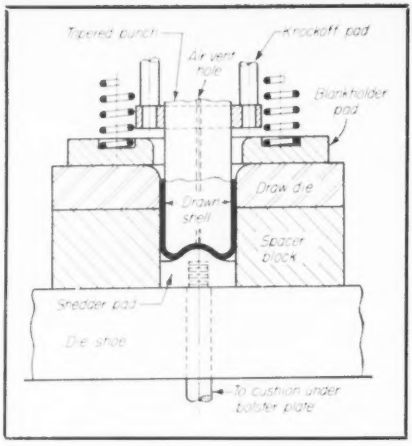


Fig. 7—Drawing illustrating first operation die setup for drawing shells with square corners and flat trimmed edges.

or nonmetallic work. It has the unusual advantage of using extra-wide die sets on a comparatively narrow bed and ram, a feature that economizes floor area in the pressroom. Another idea is that the press can be operated from either side. The ram is the pull-down type, aligned by two substantial guide posts, and this provides greater accuracy than found in some press designs. While this is a back-geared press operated by an eccentric motion, its attractive features are its unusual simplicity, easy applications, and great accuracy of work performed. Ultimate press capacity, 30-tons, stroke 2 in., shut height 10 in., strokes 100 per minute.

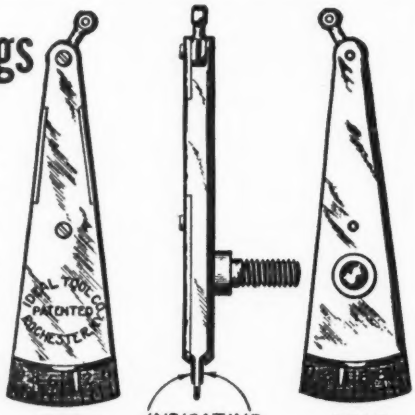
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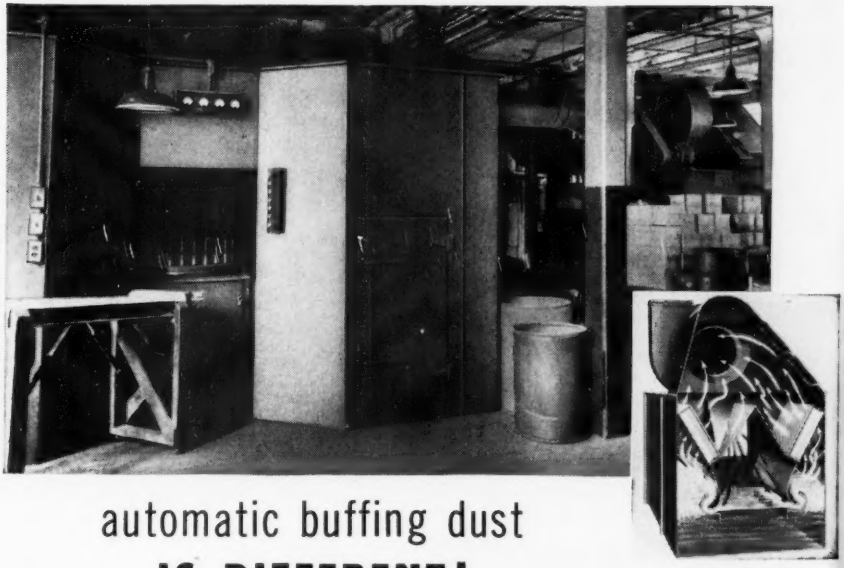


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Buffing dust has individual characteristics that create a special problem. It is composed mainly of linty particles from buffing wheels which are often impregnated with sticky compounds. Automatic buffing produces this dust in quantities and its sticky nature makes it both difficult to control or to efficiently exhaust by ordinary methods. However, a large arms manufacturer is one of many concerns which has successfully solved this problem with American Air Filter Type N ROTO-CLONES.

The Type N ROTO-CLONE is a Hydro-Static Precipitator providing collection efficiencies of more than 99%. This makes recirculation of cleaned air practical in most cases. In the Type N dust is separated from the air by means of a water curtain created by an induced flow of air through a specially designed impeller. Combined washing and scrubbing action produces high collection efficiencies on all types of dust. Arrangements are available for both manual and automatic removal of sludge.

Regardless of your clean air requirements or dust problems look to AAF for practical engineering solutions. AAF representatives are located in all major cities. Write for Bulletin No. 277.

American Air Filter
COMPANY, INC.

100 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd, Montreal, P. Q. • Pacific Division Office, San Francisco, California



is illustrated in Figs. 7 and 8. While these shells have cylindrical cross sections, other cross sectional shapes can be similarly drawn. The first-operation shell (Fig. 7) has a slightly tapered wall, and a concave bottom. This permits the punch to enter the mouth of

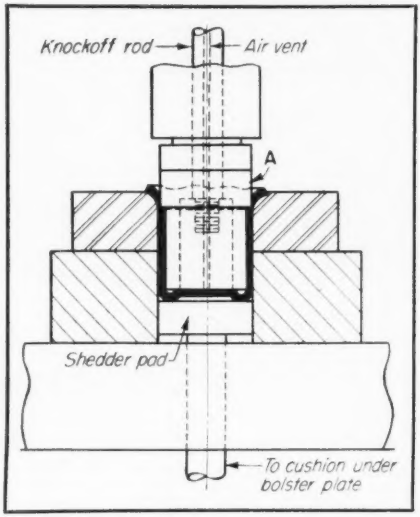


Fig. 8—Drawing illustrating second operation die setup for drawing shells with square corners and flat trimmed edges.

the shell freely in the second operation, Fig. 8.

After the first operation, the shell is annealed, pickled, and washed to remove the scale; it is then redrawn and swaged with sharp corners as illustrated in Fig. 8. This die is shown almost closed. The concave indent in the shell is forced into the square corpunch descent, and the lower corner of the shell is forced into the square corner between the sharp edge of the punch and shedder pad.

The punch itself has straight sides

Motion Study Pictures Show Waste Motion, Waste Time of Mechanical Clamping

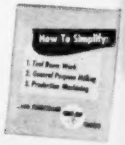


SAVE TIME

By Eliminating Mechanical Clamping On Present Machines

Here's an interesting comparison between mechanical clamping and Sundstrand magnetic clamping. The job is the same in both pictures. In the upper illustration the part is held on the table with mechanical clamps. In the lower picture the same part has been located and clamped in a magnetic fixture. Lights attached to the operator's wrists show how excessive motion has been eliminated with the Sundstrand magnetic fixture.

There are other benefits available from magnetic clamping: longer tool life, more uniform clamping and elimination of operator's fatigue are a few. There are more. Investigate.



FREE DATA is available on Sundstrand magnetic clamping fixtures. Write today. Ask for bulletin 519M.

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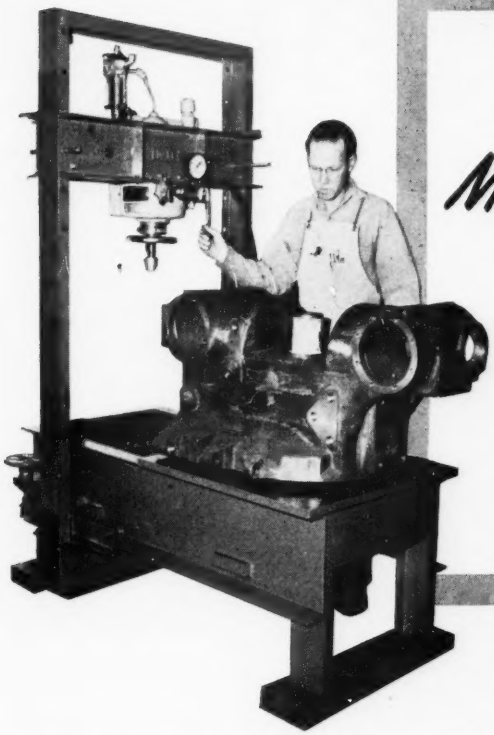
which removes the taper in the shell. The irregular edge around the top of the shell is pinch-trimmed when cutting ring **A**, in descent, closes the die opening. At the extreme downstroke, the shell corners are definitely "squared" when the shedder pad "banks" on the die shoe. The face edge on cutting ring **A** also descends upon the pinched-off edge of the shell and "squares" its trimmed edge.

Correction

The Lees-Bradner machine shown in the illustration which appeared on Page 106 of the April issue in the article entitled "Streamlined Engine Production" is a Model 7-A Lees-Bradner Hobbing Machine and not a gear shaver as stated in the caption.



"It was operated by an elderly gent who took great pride in his machine . . ."



Dake Movable Frame Presses

let you move the press over the work

If you have difficult pressing jobs, these gantry-type presses developed by Dake hydraulic engineers may be just what you need to handle them. Dake Movable Frame Presses enable you to bring the press to the work, instead of work to the press.

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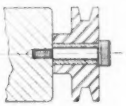
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PRESSES





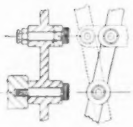
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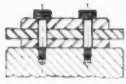
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A. Idler pulley
B. Idler gear
C. Circular form tool
D. Lever, crank or linkage arm
E. Cam
F. Latch



2. Moving Shaft or Pivot

A. Linkage bar connection
B. Cam
C. Cam follower
D. Ratchet
E. Planetary gear or pinion



3. Stationary Guide

A. Locating pin in jigs and fixtures
B. Latch stop
C. Alignment of stationary members
D. Linkage block
E. Grooved cam
F. Adjusting block

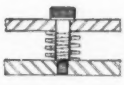
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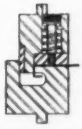
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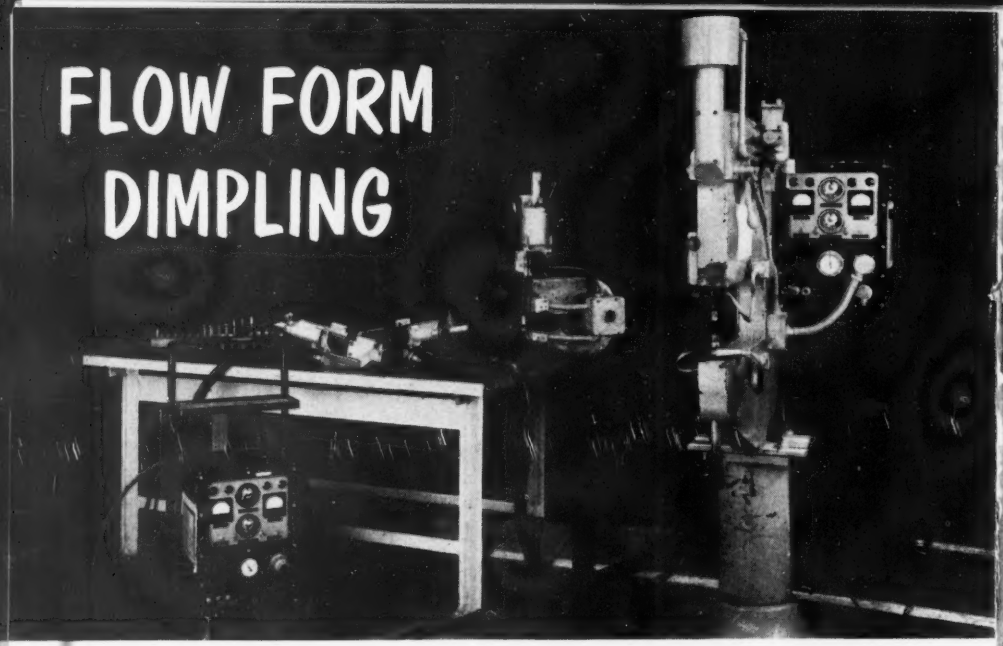
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FLOW FORM DIMPLING



Typical flow-form dimpling units now used in production work at Northrop Aircraft.

New process prevents warpage, cracks and brittleness formerly encountered in cold-formed dimpling operations

By Bartlett West

SPECIAL grades of aluminum, magnesium, titanium, and steel alloys are being successfully dimpled for the first time by means of a recently-developed process at Northrop Aircraft, Inc., Hawthorne, Calif. This process, known as "flow form dimpling," consists briefly of using heat to increase the flow of the subject materials when the latter are compressed by coining dies, the purpose of heat being to prevent the extreme brittleness, warpage, and cracks that could be anticipated if the same dimples were cold-formed.

Dimples around rivet holes on the sheet stampings used in aircraft work are essential to the production of smooth or streamlined airfoil surfaces, because the holes cannot be countersunk, due to the thinness of the sheet-metal parts, prior to assembly operations which necessitate the use of flush-head rivets, bolts, and so on.

In the flow form process, heat is applied to the work by means of electrical resistance units which are built integrally with punch and die posts—the amount of heat being proportional to the amount of time and pressure that should be used to dimple a given type of sheet stock. Die temperatures at the beginning of each operation are relatively high, but these are reduced by contact with the work to such an

extent that dies and sheet materials have approximately the same temperatures at the end of each stroke.

Heat transferred from the tools to the sheet depends on the area of the interface between the tools and sheet, the length of the contact period, and the pressure with which contact is maintained. The amount of heat that should be used in any given circumstance depends on the mass, thermal conductivity, specific heat, mean temperature rise, sheet thickness, and the dimensions of the hole to be dimpled.

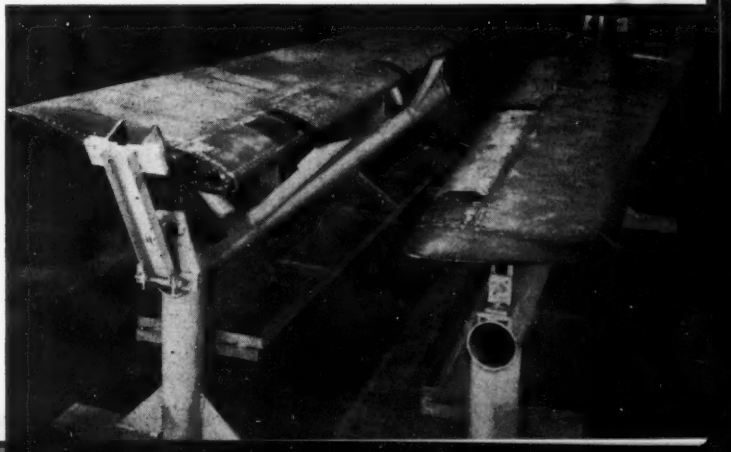
For example, in work with 75ST6 aluminum alloys, dimpling temperatures range from 300 deg. to 375 deg. F. in accordance with the sheet thickness and dimple diameter specified for each operation. Higher temperatures could be applied, if necessary, but would damage the materials if held for as many as 20 seconds.

Dwell pressures and die temperatures are predetermined by test for each fastener dimension to be used in connection with various thicknesses of different materials. Then tempilac, millivolt, oscillograph, and pull-test methods are used to ascertain dwell time—the same as in spotwelding.

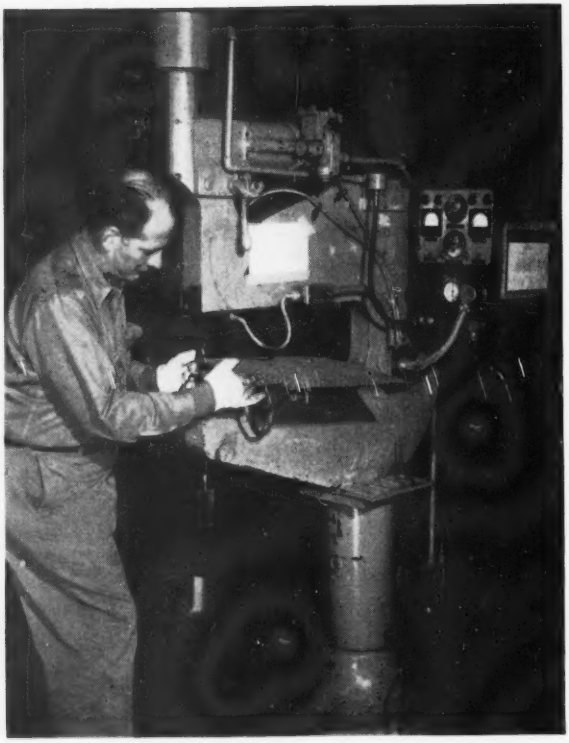
No special preparations are necessary to ready a hole for flow form dimpling. Dirt, paint, grease, and other types of foreign matter do not minimize the effectiveness of the new process; and in most cases there is no need for deburring operations of the type that would be essential to the use of a cold dimpling process.

Quite frequently, two or more detail parts are dimpled simultaneously to obtain perfect nesting—a condition that could not consistently be attained if the parts were individually dimpled. In other cases, parts with sub-countersinks are temporarily assembled with sheet components so that dimples formed in the latter will be satisfactorily nested in the sub-countersinks—a very important item where the gap between faying surfaces on an aircraft structure must amount to less than 5 per cent of the thickness of the thinnest sheet in an assembly joint.

More or less standard machine tools have been adapted to flow form dimpling operations by means of the aforementioned heating elements and coining dies. For example: (a) Where it is practical to bring the work to a machine, a stationary squeezer is now being used. It has a throat depth of 24 in. and a throat opening of 8 inches. (b) Where the work is not large enough to necessitate use of a stationary squeezer, yet too large for a portable dimpler, a pedestal squeezer is being used. This machine has a 7 in. throat depth and a 2.5 in. throat open-



▲ Elevator assemblies for Northrop aircraft. Note the smoothness of the airfoil surfaces which have been flow-form dimpled and flush riveted.



A stationary squeezer is used to flow-form dimple a sheet metal part for a Northrop airplane.

ing. (c) Where it is impractical to take the work to a machine, portable squeezers are often used. These tools have throat depths ranging from 0.62 in. to 2 in. and throat openings of 0.62 in. to 1 inch. (d) Where the work would be inaccessible to all of the above tools, a thermo-bucking bar and rivet gun are manually utilized. Clearance necessary for this equipment is 2.50 in. diameter at the die and 4 in. diameter, 5 in. as back from the die end. The overall length of the bucking bar is 8 inches.

All of the above tools are pneumatically powered, and each has a thermotronic control unit to regulate the time, temperature, and pressure of each dimpling operation.

Integral heaters for the form flow dimpling dies are rugged low-voltage elements, chrome-plated to retain heat and prevent corrosion, and their design is such that there is no danger of electrical shock to the operator of

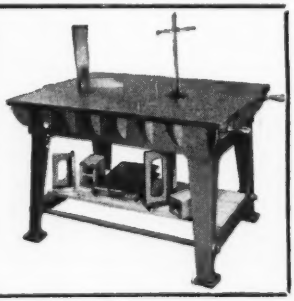
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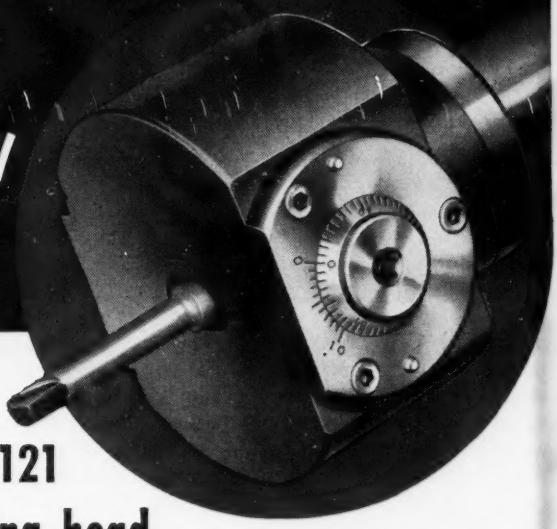
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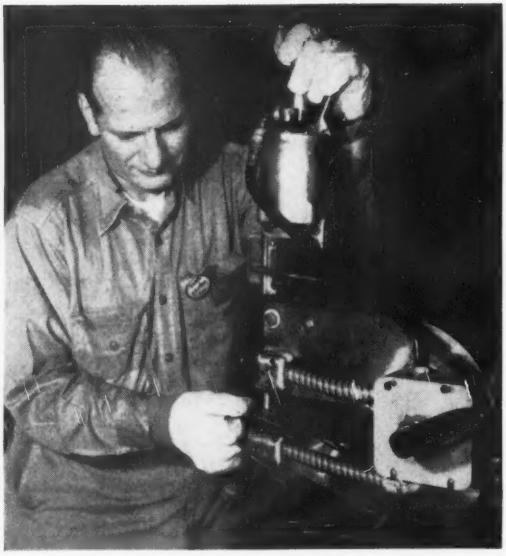
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The leading edge of a Northrop elevator is flow-form dimpled on a pedestal type squeezer.

a dimpling tool. An alignment feature in each heater compensates for any slight misalignment of the machine with which it is used, and a thermocouple in the base of each die makes it impossible to overheat dimpling materials when the thermotronic controls are properly regulated.

Form flow dimpling dies themselves are sturdy, flat-base, hard-chrome-plated tools; and each is secured by means of a lock collar for production purposes to prevent the yoke misalignments that might be anticipated if retainer rings and set screws were used. A pair of these dies can be changed in less than two minutes, and the replacement tools can be used for production work after an additional two minutes of heating time. Extra-length and cut-away dies are used to dimple hat sections, stringers, and so on.

Maximum gage thicknesses of materials now being flow form dimpled by Northrop do not exceed 0.125 in., but it is believed that material thicknesses up to 0.250 in. can be processed in the same general manner.

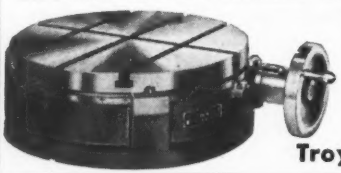
No variations in usual methods of spacing rivet holes have yet been specified due to the use of flow forming equipment, and in many cases assemblies have been spotwelded prior to dimpling.

The new dimpling process is not being used where standard dimpling techniques have heretofore been satis-

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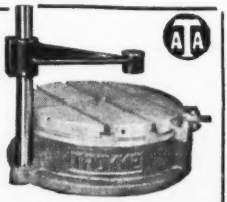
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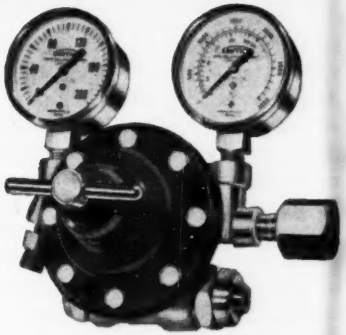
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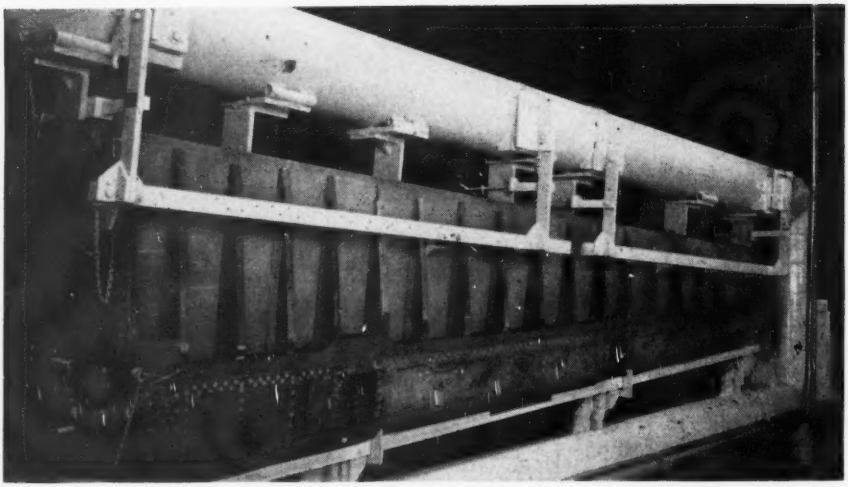


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Closeup view of parts with flow-formed dimples and flush rivets, prior to the final assembly of an elevator for a Northrop airplane.

factory, because it is a comparatively slow production process. However, dimples can be flow formed much faster than countersinking operations can be accomplished where material thicknesses are such that the use of countersinking equipment is optional.

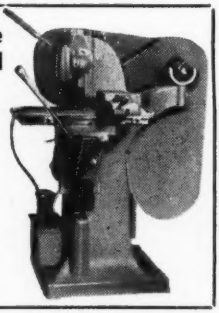
Tests to date indicate that where a given part can be dimpled with cold or hot dies, dimples made with the latter tools have 15 per cent greater mechanical strength.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

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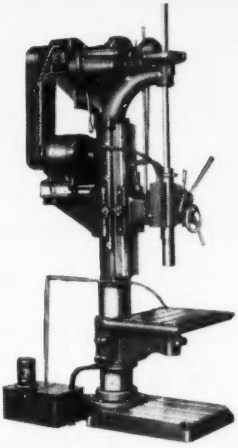
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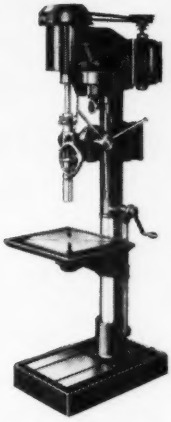
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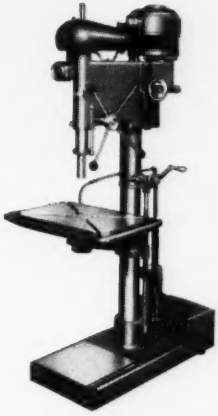
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Training New Operators

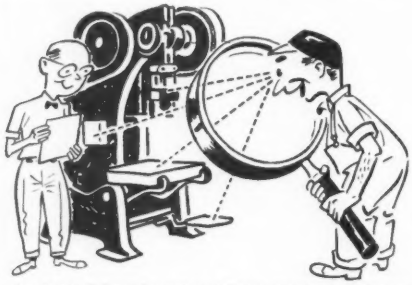
International Harvester's new employee training program stresses safety

By John Prati

General Foreman, Tractor Works, International Harvester Company

MOST companies have discovered that a planned program of new employee indoctrination pays substantial dividends not only in more efficient workmanship but also in greater employee loyalty. A newly hired person who is properly instructed in all phases of his job from the very moment he joins the organization quickly acquires the feeling of belonging.

Experienced trainers of new operators have found that safety, as a part of the first phase of training, cannot be over emphasized. At International Harvester, safety training for the new operator begins at the time of employment. After a medical examination and approval for work, the new employee is escorted by an employment interviewer to the department where he has been assigned and introduced to the department foreman who begins with an explanation of the type of work being performed. If the employee has not previously worked for the company, special care is given to an explanation of the methods and practices set up in the department.



-AND THE PARTS WHICH HE SHOULD KNOW

Illustrations by Don Ritchie.

The foreman introduces the employee to the assistant on the job, who proceeds to explain the general instructions on the check list, a copy of which is reproduced as Fig. 1. Two copies of the check list are filled out, and as items are explained to the new employee they are checked off the list. When the list is completed, the duplicate copy is given to the employee for future reference. The assistant returns the employee to the foreman's office and the foreman proceeds to introduce him to the departmental Safety Inspector for a tour of the department.

The first day in the plant, the employee is given an opportunity to observe all of the machines he will probably be called upon to operate. The importance of cooperating with the

NEW DRILL STOP

a positive control for depth of hole

by SJ SCULLY JONES

End Guesswork and Reduce Rejects:
You often require close control of depth for operations — as in center drilling, drilling and reaming — on turret lathes, radial drills and other machines. On these operations, or wherever a quick change arrangement is used in one station for sequence operations, you hold uniform hole depth by using the new S-J Drill Stops. They provide a positive stop which ends guesswork and reduces rejects.



Quick and Easy to Insert, Remove and Adjust Tools:
Simply loosen set screw and slip stop collar from threaded shank for quick insertion or removal of taper shank tools. The threaded lock bushing provides quick and accurate adjustment of the stop collar. Only a quarter turn of the set screw forces the bushing against the shank threads for a positive lock.



STOPS ON FIXTURE BUSHING OR WORK

Work on Close Centers:
The small body diameter permits you to operate these Drill Stops on close centers and near shoulders or other obstructions.

Trouble-Free Performance:
S-J Drill Stops are made from an alloy steel with all points of wear hardened for long life. The four chip grooves tend to break up and remove any chips from the surface on which it stops. Investigate the use of S-J Drill Stops wherever you require a positive control for depth of hole. Made in 8 sizes having Morse Taper shanks and holes.

Write for BULLETIN NO. 18-50 for data on Drill Stops.

Scully-Jones AND COMPANY

1909 S. Rockwell St., Chicago 8, Ill.

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

GENERAL INSTRUCTIONS CHECK LIST
(For Use With New Employees)

Employee's Name ..... **Occupation** .....
Number ..... **Date Employed** .....
Experienced ..... **Inexperienced** .....

TO DEPARTMENT FOREMAN

This form is to be used by your 2nd Assistant Foreman as a check list when imparting general information to a new employee. He is to indicate by a check mark (in ink) after each of the questions if the answer is yes. Then he is to sign and date it in the space provided at the bottom. You are also to sign this form after you have personally checked up on the new man after a week has elapsed to make sure the new man has retained the information given him by the 2nd Assistant Foreman. When the man is transferred, send this check list to his new Department Foreman.

Record on the back of this sheet any accidents this employee has while on the job, together with the date. Also record on the back, outstanding instances of laxity in maintaining quality or neglecting equipment. Likewise, any outstanding effort to maintain quality and take care of equipment. All notations to be made in ink.

SAFETY

Have you instructed him about safety on the type of work he is to do; such as the necessity for shutting off the power when setting up, adjusting, cleaning and oiling his machine?.....The danger of loose fitting garments, as long coats, aprons and neckties?.....The danger of wearing long sleeves, gloves, and rings? .....About Goggles?.....About Safety Shoes?.....About Saftey Meetings?.....Does he know where the stretcher is?.....How to report all injuries?.....And not to neglest small scratches?.....Has he met his Safety Dealer?.....Does he know smoking is allowed only in the washrooms during noon hour?.....Does he know where the Fire Extinguishers are and the kind to use for RUBBISH?.....OIL?.....or ELECTRICAL FIRES?.....Has he been instructed as to the proper use of compressed air or steam?.....Will he report unsafe practices to Safety Dealers, or the Foreman?

QUALITY

Have you instructed him as to the necessity for "Quality"?.....That it is the foundation for our business?.....How to check his work?.....And to set aside defective parts?.....Have you explained to him about the departmental Quality Log?.. .....Have you asked for his cooperation to maintain quality?.....

EQUIPMENT

Has the man been instructed as to the proper care of equipment?..... Have you asked him not to abuse same?.....Does he know what it costs? .....and what it is intended for?.....Does he know the proper oil to use? .....Where to oil?.....And how often?.....Does he know he is being paid to clean and oil the machine each shift?.....Do you feel the man has been thoroughly instructed in the above matters?.....

End of Instruction Period—Date

Second Assistant Foreman's Signature

Checked by Department Foreman—Date

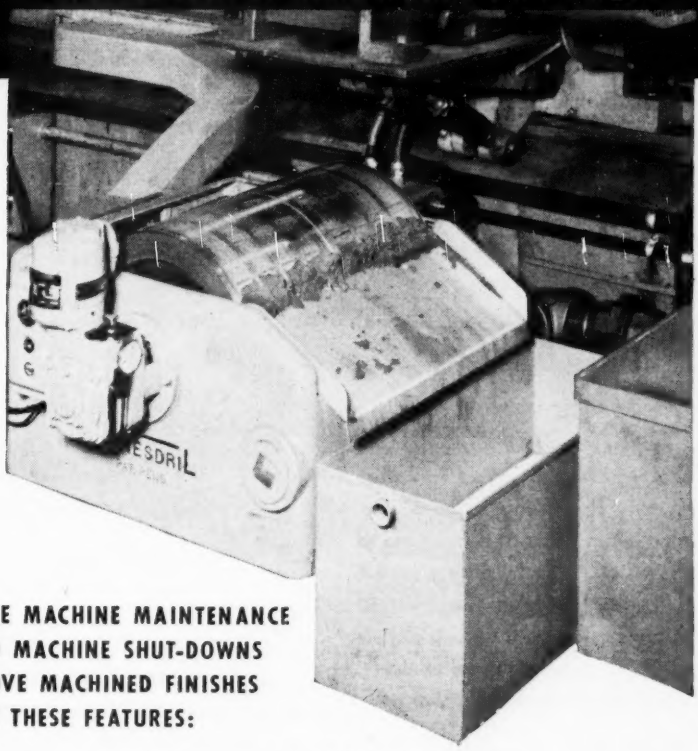
Department Foreman's Signature

Fig. 1—Reproduction of General Instructions Check List

BARNESDRIL MAGNETIC COOLANT SEPARATOR

OFFERS SIMPLE, POSITIVE COOLANT CONDITIONING

For Production and Machine Savings!



REDUCE MACHINE MAINTENANCE
AVOID MACHINE SHUT-DOWNS
IMPROVE MACHINED FINISHES
CHECK THESE FEATURES:

Permanent ALNICO Magnets Insure Infinite Life

Extra Long Magnetic Field Overcomes Viscosity Resistance On Small Particles

Coolant Flow Directed Through 27½" Concentrated Magnetic Field

Counter Rotation of Magnetic Drum Removes Non-Metallic Particles

Interlocked Magnetic Field Assures Consistent Magnetic Attraction

Write for Bulletin 352 for Latest Information on **Barnesdril** Magnetic Coolant Separators.

BARNES DRILL CO.

848 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

Speed Your PRODUCTION



With This Husky **Mall**

TORK-HAMMER

And Its Terrific Rotary Impact!

Put more power into manpower with this speedy portable Impact Tool that handles any tightening or removing operation. Runs nuts and bolts up to ½-inch in size. Quick conversion for drilling, reaming, tapping, extracting broken capscrews or studs . . . Drives wood augers, wire brushes, sanders, etc. Ideal for close quarter work.

Send for Descriptive Bulletin No. 2422



MALL PORTABLE ELECTRIC SCREWDRIVER
Speeds shop operations. Equipped with 2 finder-type bits, Allen hex wrench.

40 Factory-Owned Warehouses, Coast To Coast To Serve Our Customers And Thousands of Dealers.

MALL TOOL COMPANY
7814 S. Chicago Avenue, Chicago 19, Illinois

safety program is pointed out repeatedly. A die setter or dependable operator will take the new employee to the types of machines he will be working on and by means of thorough, careful explaining will point out the parts of the machines such as clutch, ram, foot and hand controls, handling equipment for feeding and unloading presses, and



so on, with which he should become familiarized. If the employee is hired for night work, it is customary that he work on the day shift for at least one week or until it is quite certain that he thoroughly understands the job.

It has been found that the personal contact made daily by both the foreman and the assistant foreman is the best method of selling safety to the new employee. A ten minute period each day devoted to a discussion of "safety on the job" has been usually found to be a sufficient amount of time allotted for this purpose.

After working on the job for several days, the new employee is required to

IN ACTION

Continental's 1-A Field Set



A HAND-DETACHABLE COUNTERBORE SET SPECIALLY ARRANGED FOR THE ARMED FORCES

To meet the specific needs of the Army, Navy, and Air Corps Continental offers this 1-A Field Set, consisting of 13 cutters for counterboring and spot-facing, 17 pilots, and two counterbore holders. Cutters are hand-detachable even after the heaviest cuts, due to Continental's unique balanced drive. Continental also offers three standard sizes of counterbore sets for toolrooms, machine repair departments, experimental departments, and general shop use. Order through your local Ex-Cell-O representative or write today to Continental Tool Works in Detroit.



Continental's complete catalog is yours for the asking. Write on your company letterhead today.

CONTINENTAL TOOL WORKS
DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

52-B

FOREMAN'S DAILY SAFETY INSPECTION REPORT

SHIFT TAKEN: 1 ——: 2——: 3——— DEPT.———

I HAVE CHECKED THE FOLLOWING FOR SAFETY: DATE———

1—Acids
2—Air (Proper Use of)
3—Aisles
4—Barricade and Warning Signs
5—Bars, Probing or Leverage)
6—Belting
7—Blocking (Proper)
8—Boilers (Steam)
9—Burners (Acetylene)
10—Chains (Use and Care)
11—Chipping
12—Chips
13—Clamps
14—Clothing
15—Conveyors
16—Crabs (Lifting)
17—Cylinders (Oxy-Acetylene)
18—Dept. Safety Insp. (Intro.)
19—Die Swabs
20—Docks (Loading, Unloading)
21—Electric Cords
22—Electric Outlets
23—Electric Panel Boxes
24—Elevators (Loads)
25—Elevators (Operating)
26—Equipment
27—Falling Hazards
28—Fire Extinguishers
29—Fire Hazards
30—First Aid
31—Fixtures
32—Flammable Liquids
33—Flash Shields
34—Floors
35—Floor Loads
36—Furnaces (Lighting, etc.)
37—Fumes
38—Gloves
39—Goggles
40—Grinding Wheels
41—Guards
42—Hair Protection
43—Heat Exhaustion (Prevent)
44—Hand Tools
45—Hoists
46—Horseplay
47—Housekeeping
48—Jewelry
49—Keys (Die)
50—Ladders
51—Ladles (Handling of)
52—Lead Pots
53—Leggings
54—Lifting (Manual)
55—Lights
56—Machine Tools
57—Material (Handling)
58—Molten Metal
59—New Employee (Helping the)
60—Outside Safety
61—Ovens
62—Pallets
63—Personal Hygiene
64—Pulleys
65—Racks (Storage)
66—Ramps
67—Respirators
68—R. R. Track Clearance
69—Safety Shoes
70—Salt Dispensers
71—Sanitation
72—Scaffolding
73—Signals
74—Skids
75—Slings
76—Stairways
77—Steam (Live)
78—Stock (Piling of)
79—Stretchers
80—Tongs
81—Traffic (Plant)
82—Trucks (Gas, Electric)
83—Trucks (Hand)
84—Trucks (Lift)
85—Wet Sand (Foundry)
86—Welding (Arc)
87—Welding (Acetylene)
88—Welding (Resistance)
89—Yards
90—Others .....
.....
.....
.....

Safety Order Issued .....
Shop Order Issued .....
Talked to Gen. Fore. ..... Completed: Yes .....
Talked to Safety Supr. .....
Talked to Dept. Safety Insp. .....
Talked to Employee ..... Completed: No .....
REMARKS: .....
.....
.....
.....
Signature

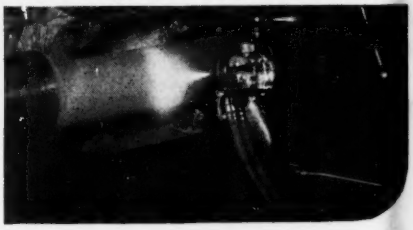
Fig. 2—Reproduction of Foreman's Daily Safety Inspection Report

NOW... new gun makes metallizing a bigger time-and-money saver than ever before



Salvaging worn feed roll journal for textile mill.

Building up 6" dia. by 12" lg. bearing section on shaft from heavy duty crusher with .25 carbon steel.



New Metco Type 4E gun sprays 40% faster than older models; produces uniform coatings with minimum operator skill; lower cost operation with minimum maintenance.

Here is another Metco development that makes metallizing a still more profitable tool for the modern machine shop. It's the new Metco Type 4E Gun. With the older types of metallizing guns, constant operator attention was required to maintain oxygen and gas pressures within a close range to obtain uniform coatings. Now, with this new gun, gas pressures are automatically balanced against variations as great as 10 lbs. Now, so little operator attention or skill is required, that the gun almost runs itself.

In addition to this advantage, the Metco 4E gun sprays up to 40% faster than older models. Wire feed is also controlled automatically for any wire size, from 20 B&S gauge to ⅛", in any metal.

Add to these advantages the recent development of the new metallizing material, Sprabond Wire, which bonds itself to smooth steel surfaces without any mechanical preparation except cleaning. It serves as the perfect preparation coating for spraying with any other finish metal.

Free Bulletin or Shop Demonstration—Send off the coupon below for detailed information. Or, better yet, ask for a demonstration in your own shop by a Metco Field Engineer. He will be glad to show you how the new Metco 4E gun works on jobs of your own. No obligation, of course.

The following names are the property of Metallizing Engineering Co., Inc.: Metco*, Sprabond Wire.

*Reg. U. S. Pat. Off.

REPAIR COSTS RUN AS LOW AS 10% OF REPLACEMENT COST

Metallizing gets worn parts like these back in service faster and at lower cost than any other method of repair:

Air Compressor Parts	Patterns
Armature Shafts	Pistons
Axle Shafts	Piston Rods
Camshafts	Plungers
Crankshafts	Pump Packing Sleeves
Cylinder Liners	Pump Plungers
Fan Shafts	Roll Journals
Hydraulic Rams	Rolls
Impellers	Spindles
Journals	Squeeze Rolls
Lathe Beds	Turbine Shafts

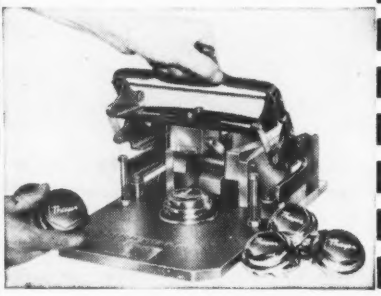
METALLIZING ENGINEERING CO., INC.
38-17 30th STREET — LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England

R. J. McWaters
Metallizing Engineering Co., Inc.
38-17 30th St., Long Island City 1, New York
☐ Please send me further information on the Metco 4E gun.
☐ Please arrange a free demonstration in my shop.

NAME_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____

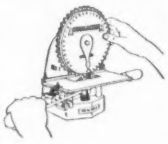
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MEANS "ACCURATE MARKING"

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WITH COLOR, or
PRINT- STAMPED,
DIE-CAST, EMBOSSED
AND MOLDED METAL AND
PLASTIC PARTS WITH —



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METAL SIGNS,
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"THE ORIGINAL MARKING SPECIALISTS"



attend two meetings each of which is about two hours in length. During the first meeting, which is conducted by the training department, such items as Harvester policies, vacations, union activities, and so on, are discussed. At the second meeting, conducted under the supervision of the safety department, general safety rules are discussed, a safety film is shown, and a safety rule book is issued during the first part. The latter part of the second meeting is conducted by the plant protection department during which time instructions are given on fire prevention, various methods of fighting fires, and the equipment which is available to fight them.

Safety at International Harvester has become a by-word. It is applied with great concern on the job by the employee throughout his entire working period. An inspection report, as shown in Fig. 2, is made out by the foreman of a manufacturing department each day. This type of active reporting has blazed the way toward better, safer working conditions for all.



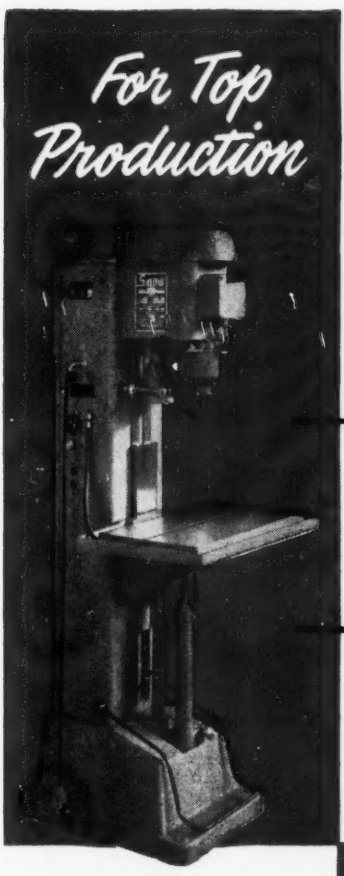
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THE MAN WANTS!

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

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FULL UNIVERSAL MACHINES

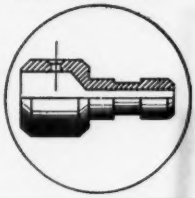
Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:



DRILLING

Crossdrill and C"T" Sink 1/16" Hole

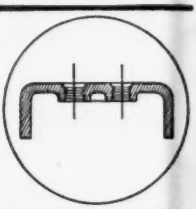
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



TAPPING

Tap Two #10-32 Holes

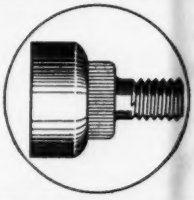
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



THREADING

3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

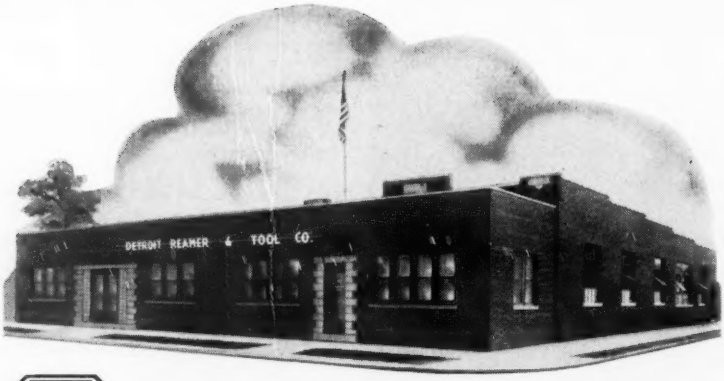
SNOW

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Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Time Estimates



DETROIT REAMER & TOOL CO.

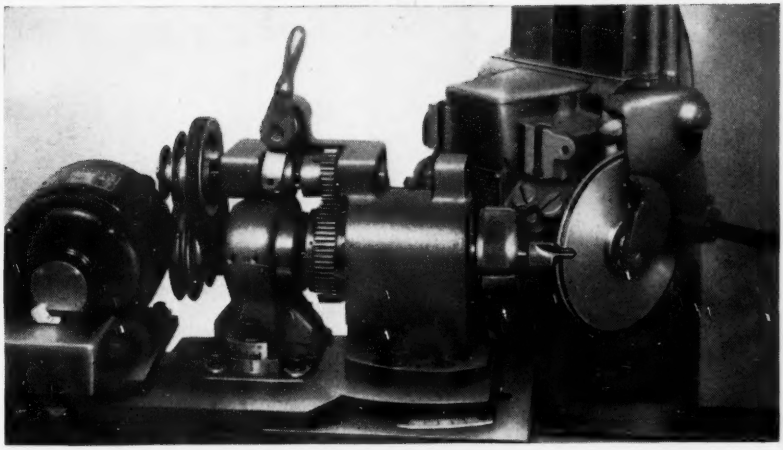
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The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with 35 years of empirical knowledge behind them are completely qualified to expertly handle your tool needs. For dependable cutting tools—specify Detroit Reamer & Tool Co.

The Detroit Reamer & Tool Company has developed the

Special Cutting Tools of DEPENDABLE QUALITY





Circularity-Grinding Attachment illustrated above to permit your own tool makers to quickly and easily answer your production requirements for new cutting tools. With this attachment, new cutting tools can be quickly ground from raw stock, old tools converted to meet new requirements or standard tools reground to your specifications. The Circularity Grinder is of inestimable value when emergencies exist, demand for a new tool is urgent or production lines must be kept running. With this attachment in your shop you eliminate delayed deliveries.



You Can Grind Tools Like These on a **DETROIT REAMER CIRCULARITY GRINDING ATTACHMENT**

"PRECISION CUTTING TOOLS OF DEPENDABLE QUALITY"

manufactured by

DETROIT REAMER & TOOL CO., DETROIT 34, MICHIGAN

CYLINDER POWER

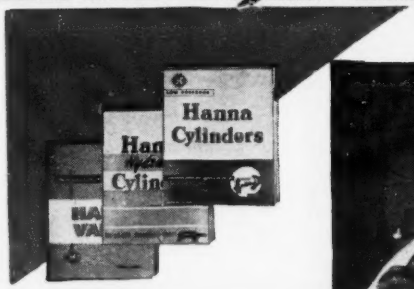
increases production

UP TO 100%...

HANNA
AIR and HYDRAULIC
CYLINDERS

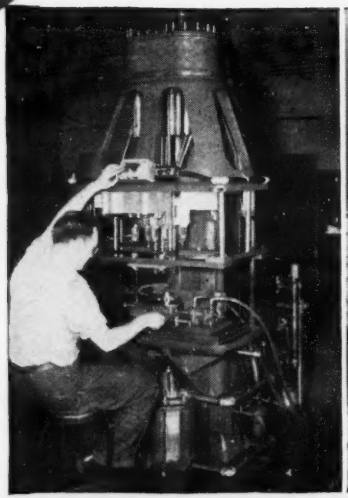
Use It 1001 Ways For Pushing, Pulling, Lifting, Pressing, Clamping, Controlling

INVESTIGATE Hanna Cylinder Power to speed production and lower costs. Hanna Air and Hydraulic Cylinders are used in hundreds of applications throughout industry—in all types of machines and equipment—to get things done faster, relieve tiresome manual operation, simplify actuation and control. Cylinder Power is easily adaptable, safe and inexpensive!



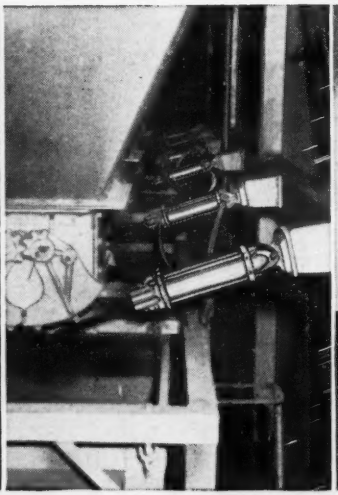
Send for Catalogs

Ask for Catalog No. 236 for Hanna Low Pressure Cylinders — Catalog 233A for Hanna Hydraulic Cylinders and Catalog 254 for Hanna Valves.



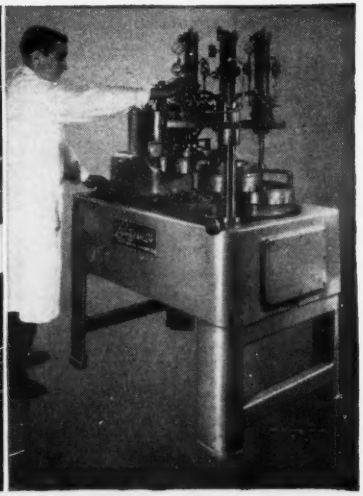
REDUCES FATIGUE

One pushbutton starts the Natco cycle for continuous, automatic operation of this drilling machine. Hanna Hydraulic Cylinders feed the table and Hanna Pneumatic Cylinders engage drillpress clutch and workpiece clamp.



REMOTE CONTROL

What could be more simple and dependable for opening and closing these hopper gates than Hanna Cylinders? They are operated from remote station with Solenoid Valves and Pushbutton Panel.



DOUBLES PRODUCTION

Hanna Air Cylinders raise and lower the entire conditioning ring-pressure plate units to permit fast, efficient loading and unloading of parts on this Lapmaster. In many cases, production has been doubled over manual operation.

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

1758 Elston Avenue, Chicago 22, Illinois

Typical Cam Forms Accurately Band Machined

Sawing method speeds production of cams, gears, racks and similar contoured parts

By H. J. CHAMBERLAND
Research Engineer

IT is true that screw machine cams very often require the precision of a forming tool. On the other hand, at least 30 per cent of the cams used on screw machines and 60 per cent of the cams used in connection with less complicated automatically functioning equipment are of designs permitting a reasonable tolerance which can usually be met by band machining the parts.

Two factors usually account for the hesitancy on the part of management to favor contour sawing for at least a part of its cam requirements. One is fear of losing control over the outline and the other is doubt as to the quality of the finish. It should be realized that sawing is but the first function of the machine, the second is filing and the third is polishing. Contour sawing to within 0.005 in. of the outline is no problem, providing effective measures



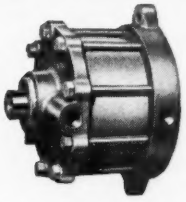
The cutting of accurate cam forms by means of band tools is not an exceptional undertaking. Teeth in gears, sprockets and racks as well as spiral grooves in airplane engine cylinders are frequent applications for this modern manufacturing process.

Tell Us Your Production Problems . . . We'll Help You Solve Them

"LOGAN" Rotating and Nonrotating AIR CYLINDERS

Fast-Acting, Positive Controlled Power.. At LOW COST

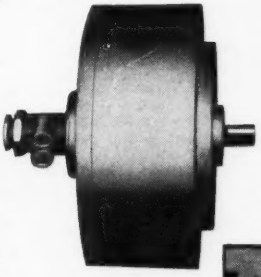
NONROTATING—
7 STANDARD MOUNTING TYPES



Standard sizes from 1½" to 12" bore; maximum stroke, 18 feet. Special models to meet your requirements.

Logan Features — Larger Ports . . . More Sturdy Construction . . . Maximum Power Without Leakage . . . Permanent Seal Around Piston Rod . . . Standard Models Available With or Without Cushioning.

ROTATING—



Two Standard Styles — Model R with cast iron body; Model K with lightweight aluminum body.

Bore diameter 1½" to 20"; piston stroke 1" to 2"; longer strokes available as special. American Standard adaptations; simple, efficient design to assure positive, rapid, economical operation.

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Logan Manufactures 6,975 Standard Cataloged Items

Free Catalog On Request

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COLLET GRIP TUBE FITTINGS CATALOG 44
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Let Logan Engineers help you design your Air and Hydraulic Circuits.

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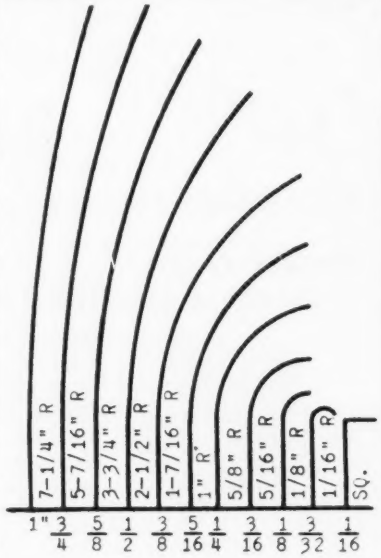
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FLUID POWER SPECIALISTS SINCE 1916

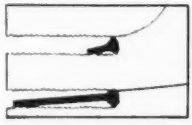
Saw Selection and Radii Cutting Chart

PITCH CHART ACTUAL SIZE	Available in the Following Blade Widths	Nominal Set	GA
32 TEETH/INCH	1/16" - 3/32" - 3/16" - 1/4"	.040	.025
24 TEETH/INCH	1/16" - 1/8" - 3/16" - 1/4"	.040	.025
	3/8" - 1/2"	.043	.025
	5/8"	.055	.032
18 TEETH/INCH	3/32" - 1/8" - 3/16" - 1/4"	.040	.025
	3/8" - 1/2"	.043	.025
	5/8" - 3/4"	.054	.032
14 TEETH/INCH	1/8" - 3/16" - 1/4" - 3/8"	.040	.025
	1/2"	.043	.025
	5/8" - 3/4"	.054	.032
	1"	.057	.035
12 TEETH/INCH	1/4"	.040	.025
	3/4"	.054	.032
10 TEETH/INCH	3/16" - 1/4" - 3/8" - 1/2"	.040	.025
	5/8" - 3/4"	.054	.032
	1"	.058	.035
8 TEETH/INCH	3/8"	.043	.025
	5/8" - 3/4"	0.54	.032
	1"	.057	.035
6 TEETH/INCH	1/2"	.043	.025
	3/4"	.054	.032
	1"	.058	.035



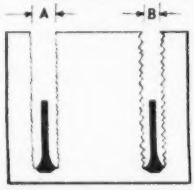
Radii Capacity Actual Size

The set of a band saw blade makes possible saw filing, a technique whereby the band saw blade can be used as a narrow continuous file band to finish sharp corners and small radii that are not otherwise accessible with a standard file band. In saw filing the blade is used at right angles to the layout line, so the cutting edge of the band can be used to remove excess metal. The slight angle at the top of the teeth which is a result of the setting operation makes it possible to move the work from left to right and against the band to accomplish the filing operation. Fine pitch blades are best adapted to this procedure as they give the best finish.



A

Fine pitch and slow feed gives a wide slot approaching nominal set of saw.

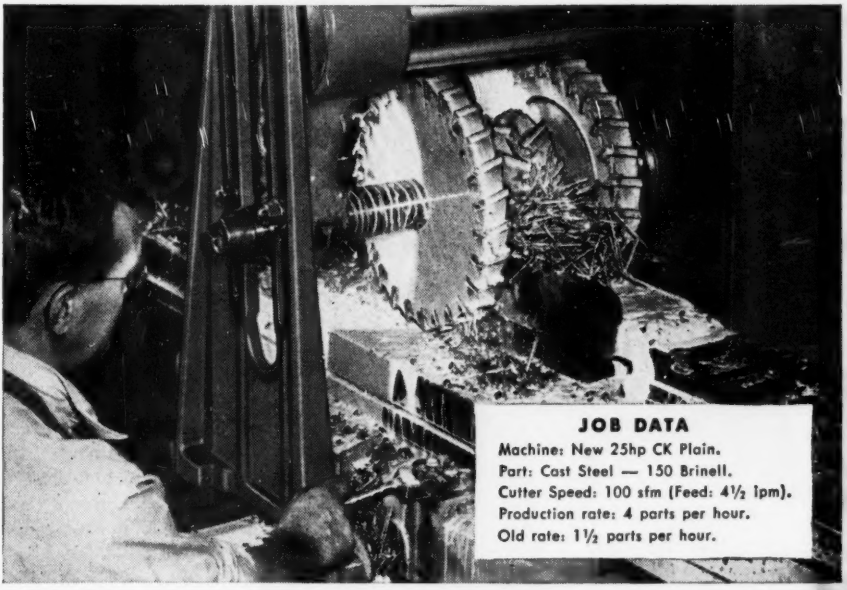


B

Coarse pitch and rapid feed give a narrower slot.

FACTS TELL THE STORY...

NEW KEARNEY & TRECKER CK MILLING MACHINE PAYS USER BIG PRODUCTION DIVIDEND



JOB DATA
Machine: New 25hp CK Plain.
Part: Cast Steel — 150 Brinell.
Cutter Speed: 100 sfm (Feed: 4½ ipm).
Production rate: 4 parts per hour.
Old rate: 1½ parts per hour.

CK Milling Machine Features that helped do this job BETTER

- Greater Rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.
- Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut permitted heavy cut.
- No. 60 heavy-duty drive flange around spindle nose permitted use of extra-rigid, large-diameter arbor on multiple cutter setup.
- CK's positive, metered, pressure and automatic lubrication to all parts assured wear-free operation regardless of cutting load.
- 24 different spindle speeds (13 to 1300 rpm) plus 32 different table feeds (¾" to 90 ipm) meant operator selected exact combination to get fullest advantage from high horsepower and modern cutting tools.
- Greater Horsepower of CK machine meant maximum results from modern cutting tools.
- CK's 3-bearing spindle and flywheel assured fastest metal removal with desired finish in single pass.

Investigate the new CK line of milling machines. Every feature is job and test proven to give you cost-cutting results, plus greater productivity—better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6734 West National Avenue, Milwaukee 14, Wisconsin.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

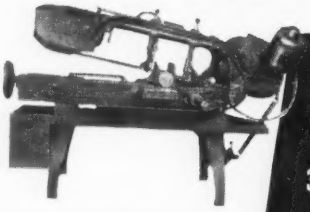
to accomplish the purpose are put into practice. A practical stock allowance to simplify the band filing operation is important, so that the filing can not only be readily accomplished but will also allow using as fine a file band as possible to simplify the polishing operation.

The first step required for accuracy, when contour sawing cams, is a dependable layout line. It is imperative that the layout fluid or compound used be glare and crackproof, adheres evenly and dries quickly so that the line will be of extreme fineness and yet visible. The operator who is not familiar with precision contour sawing or whose eyesight is not up to par should, by all means, use the magnifying attachment provided for this purpose. Some operators who are over-confident of their dexterity, use too much feed to expedite the cut and thereby risk sawing too close to the outline. Saw marks on the low spots cannot always be removed with the file band and still comply with specifications.

There is also a false concept that a ⅛ in. precision saw cannot deliver the same perpendicular accuracy as a ⅜ in. and ½ in. width. Naturally, the narrower blades cannot resist the work pressure applicable to the wider ones but performance is based on the scientific heat treating of the blade rather than width. There are few cam forms

5 BIG REASONS

Why Wells Band Saws slash metal cut-off costs



1. Fast, Accurate Action
2. High Job Productivity
3. Low Operating Cost
4. Real Blade Efficiency
5. Long, Dependable Service

Above is the Wells No. 8, shown with wet cutting system. It offers a capacity of 8" x 16", rectangular, 8" dia., rounds.

YOU are always ahead when you handle your cut-off jobs on "Wellsaws." The Wells Band Sawing method will not only reduce your operating costs, but also give you greater job efficiency — better cuts, and real dependable service. There is a size and type for every need and every budget. Capacities range from 3½" x 6" to 48" x 48". Write for descriptive literature.

Wells Cams

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

808 TYLER ST. - THREE RIVERS, MICH.

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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Welded design builds stronger products ... at half the cost

THE proper use of welded steel strengthens the construction of many products while cutting costs 50%.

As shown in Fig. 3, a simple duplication of a design in mild steel generally reduces material costs to as little as 35% of traditional gray iron construction. However, when designs utilize the inherently greater strength and rigidity of steel, still fewer pounds of metal are required and material costs can be cut to 15%. Ultimately, the efficient use of formed engineering shapes from sheet or plate can eliminate further metal, cutting the material expense to as low as 5%. With these substantial savings in material costs, the designer has a latitude of 35% to 45% in which to fabricate and still realize overall cost savings of 50% in the manufacture of his products.

Whenever weldment costs do not approximate this yardstick, designs generally are falling short of incorporating the full economies of welded steel. A Lincoln Welding Engineer will gladly demonstrate how you can benefit on present and future product developments. Call or write.

PROPER DESIGN IN WELDED STEEL ALWAYS IMPROVES PRODUCT AND LOWERS COST

Fig. 1—Original Construction *of hanger. Cost....$5.20. Weight 18 pounds.*

Fig. 2—Present Weldesign in Steel
Saves 52% in cost. Costs....$2.50 Weighs 12 pounds.
Photos courtesy Dorsey Trailer Company, Elba, Alabama.

HERE'S MORE PROOF

Machine Design Sheets are available to designers and engineers. Simply write on your letterhead to Dept. 253.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

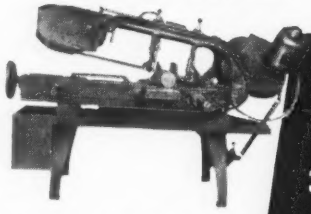
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THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

so complicated that a ⅛ in. or 3/16 in. blade cannot navigate accurately, providing the parts are of a nature to be so machined. Since ⅛ in. and 3/16 in. blades will respectively cut ⅛ in. and 5/16 in. radii and in view of the fact that with experience the operator can reduce these minimums substantially, this is a major reason why so many cam requirements are ideally suited to contour sawing operations.

As a general rule, the material thickness of cam blanks demand a precision blade of either 10 or 14 pitch, operating at a velocity of from 175 to 200 fpm; the 14 pitch at 200 fpm refers to a thickness exceeding ½ in. and up to 1 inch. The average cutting rate on a tool steel cam of ½ in. thickness is 2½ lineal inches per minute; this applies to a straight cut. A 15 in. cut on a cam of average design can be executed in about 15 minutes. When a maximum of 45 minutes is added to the sawing time for band filing and band polishing, this adds up to a total production time of one hour. Surely no one can fail to admit that the contour sawing process is not at least worthy of consideration, particularly when it is recognized that many shops specializing in screw machine products cut many cams by this method.

It is a well known fact that many a short run screw machine product requisition is regularly being diverted to



The only portable machine which reproduces 15 sizes from one master alphabet.

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Self-centering holding vise for nameplates.

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I-S—27 portable model • H—27 heavy duty model

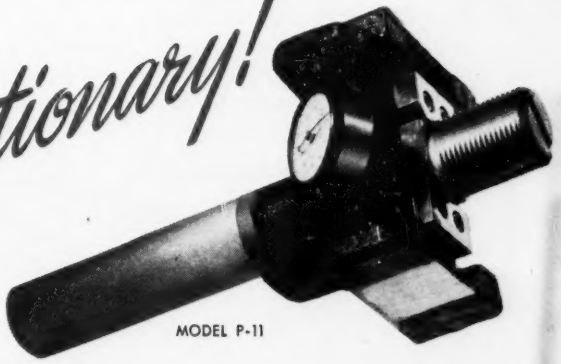
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Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.



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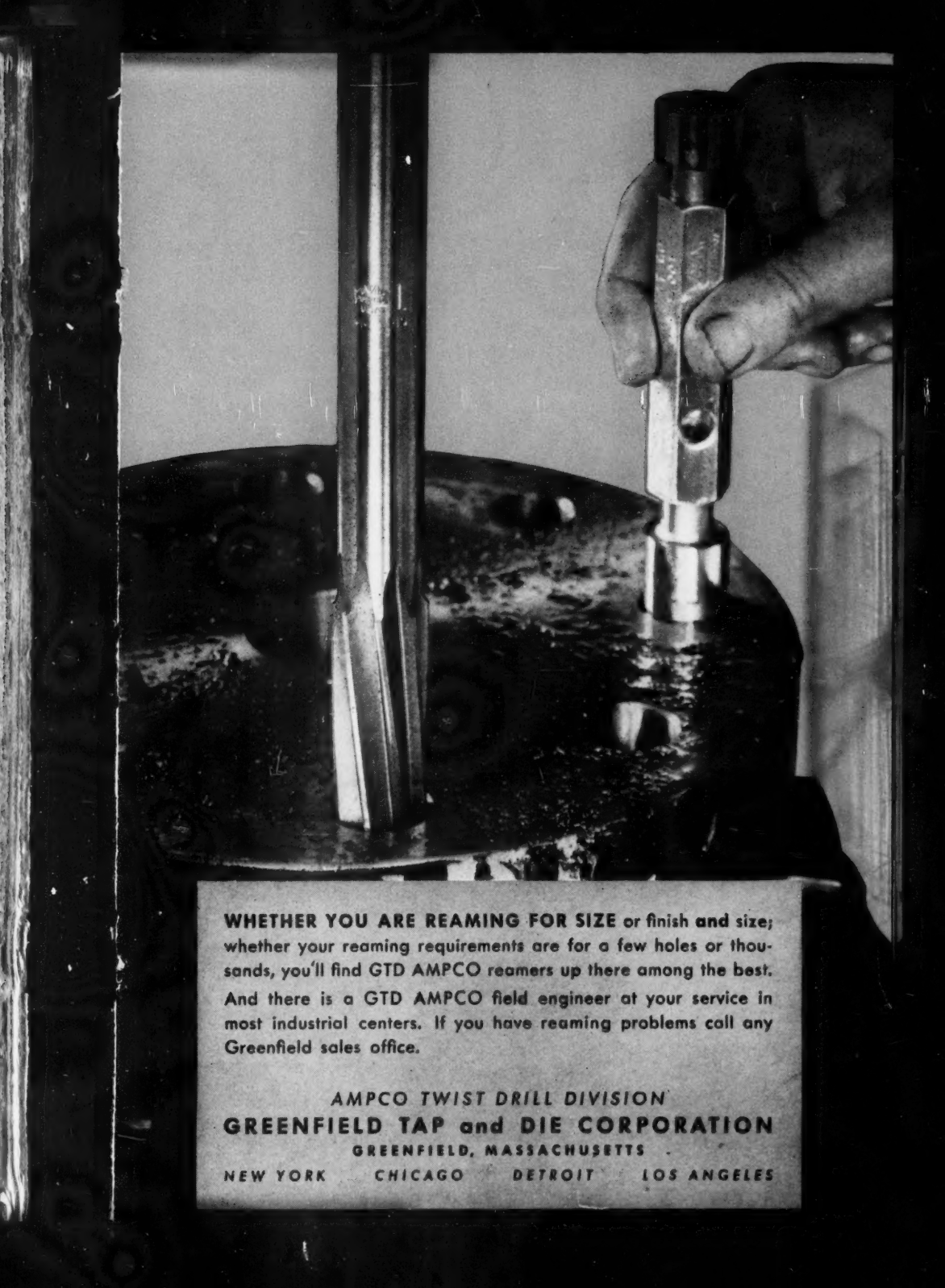
STREET_____

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turret lathes, because of the fact that automatic screw machine tooling cost appears to be out of line as effecting cost per unit. Realizing that the same cutting tools are used, but admitting that the cost of a forming tool often has to be considered, it will be found that the use of cams on the screw machine will in many cases prove to be practical, particularly so if two cross slide cams and a lead cam can be contour machined at the cost of a single cam if made by conventional methods. Not only would contour sawing reduce the cost of the cams to a point where it would be advantageous to use them, but a delay of several days in getting the job started would be reduced to a matter of hours.

Most efficient results are usually achieved by the cam designer, production engineer and foreman getting together to work out an inexpensive and yet highly productive setup. Alterations in cam design, suggested by minor changes in loading procedure and also the giving of more attention to the efficiency of standard attachments as well as the proper size automatic for the job, will often result in a screw machine out-producing a turret lathe two to one. This also applies to second operation work so often done in turret lathes, when two or three seconds added to screw machine time could conceivably eliminate a secondary operation which might otherwise require fifteen seconds or more.





WHETHER YOU ARE REAMING FOR SIZE or finish **and size;** whether your reaming requirements are for a few holes or thousands, you'll find GTD AMPCO reamers up there among the best. And there is a GTD AMPCO field engineer at your service in most industrial centers. If you have reaming problems call any Greenfield sales office.

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to cut your portable grinding costs!



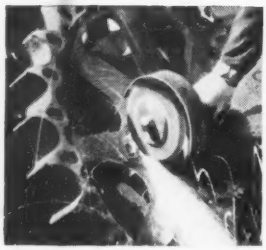
FASTER GRINDING, LONGER WHEEL LIFE AND LESS OPERATOR FATIGUE add up to big savings when Norton wheels take over your portable grinding jobs. *They hug that work!*

Yes, Norton portable grinding wheels have *controlled uniformity* and *built-in balance*, the like of which you've never seen before. This gives them a unique ability to stay in more continuous contact with the work. This *plus* comes from the "new process" of manufacture recently developed by Norton technicians . . . an outstanding step in the continuing Norton program to cut all your grinding costs.

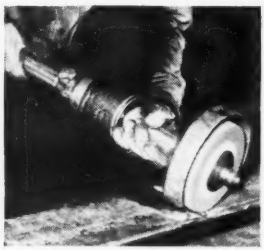
Ask your nearby Norton distributor to give you all the facts about new, improved Norton portable grinding wheels. He's listed under "Grinding Wheels" in your classified telephone directory. Or write direct to Norton Company, Worcester 6, Mass. Distributors in all principal cities.

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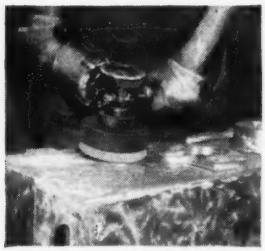
NORTON PORTABLE GRINDING WHEELS HUG THAT



SNAGGING GIANT DRIVE WHEELS is just one of many jobs done by Norton straight wheels at lower labor and wheel costs. *They hug that work.* So, they don't waste time or wheels . . . nor tire the operator.



HEAVY DUTY WELD GRINDING is another job for which Norton straight wheels are the popular choice. Their controlled uniformity and built-in balance keep them cutting faster, easier and longer.



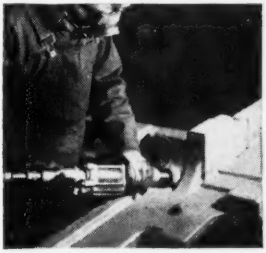
SURFACING A MACHINE TOOL BASE is easy work for a Norton cup wheel and its operator. The wheel's fast, smooth cutting action means low grinding cost and minimum operator fatigue.



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WORK AND CUT YOUR COSTS ON JOBS LIKE THESE:



SMOOTHING UP THIS BED CASTING OF A PRINTING PRESS is a typical example of the cost-cutting performance of Norton cone wheels. They're built to take it . . . thanks to the special Norton resinoid bond.



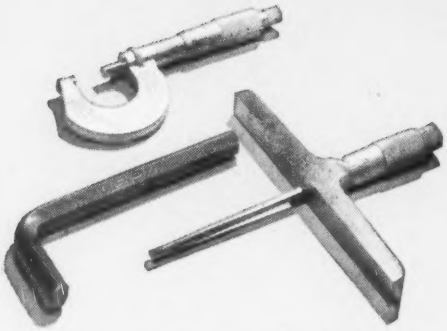
CLEANING BETWEEN THE FINS OF THIS COMPRESSOR CASTING is an easy job with a Norton REINFORCED Hub Wheel of the rigid type — the BD. It's fast cutting, and its layers of fabric reinforcement assure maximum safety.



BLENDING IN A WELD can be done speedily with the new flexible Norton REINFORCED Hub Wheel. It's known as the Type BFR and is not only fast cutting but safe to use because of its fabric reinforcement.

other products better

NORTON
ABRASIVES

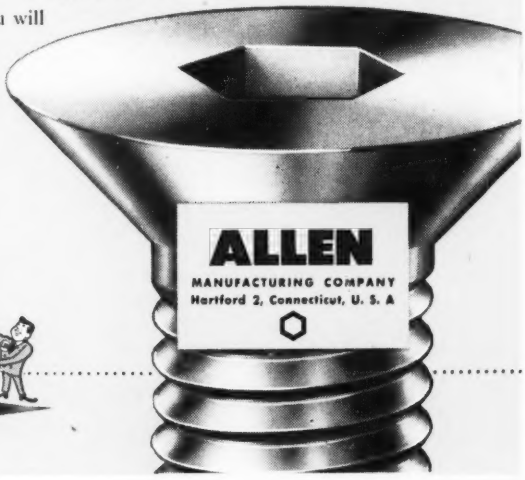


Standard symbols for **PRECISION**

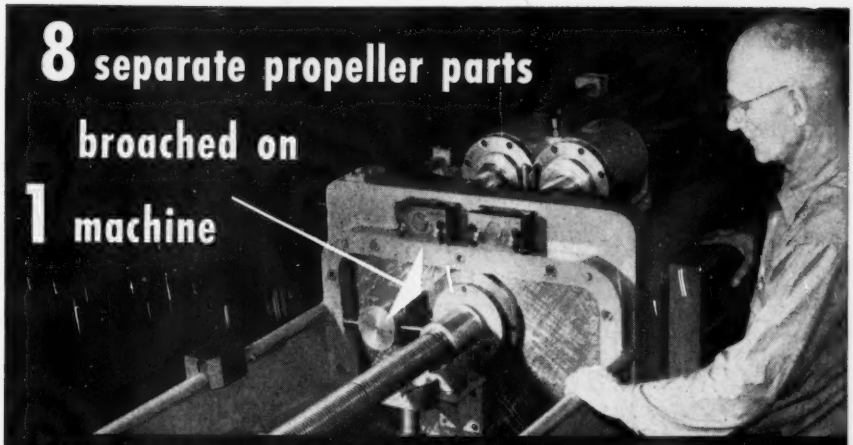
A "mike" and an Allen Key keep steady company wherever precision measurements and precision adjustments go hand in hand . . . and where positive locking and vibration-free performance are important to maintaining precision.

Look for the First Name in precision screws at the Industrial Distributor who stands first in *his* field in your locality. He has the stock, the experience, and a wealth of specific information on applications for precision fastenings that you will find invaluable.



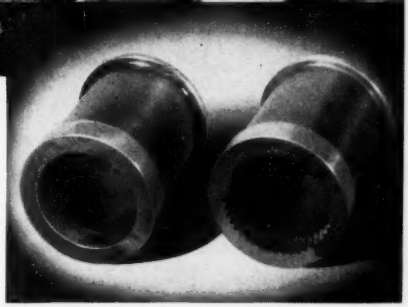


8 separate propeller parts broached on 1 machine



A PROPELLER MANUFACTURER GOT THESE BENEFITS FROM HIS AMERICAN HORIZONTAL MACHINE:

1. Tooling is readily inter-changeable for eight separate parts of short run production.
2. Large parts are easily loaded and unloaded.
3. Double helical drive for right and left hand helix readily adaptable to machine.
4. The horizontal machine provided the most tonnage and stroke per dollar invested.



To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears.

Number of spline teeth vary from 43 to 55 with diameters ranging from 2¾" to 3½", and with length of splines cut ranging from ¾" to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.

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A Gaging Policy

Suggestions Offered To Help Efficiently Operate and Maintain Gaging Facilities

By THOMAS J. BIZZOCO
Supervisor of Tool and Gage Inspection, Arma Corporation

IT is becoming apparent that fourth place decimal tolerances are being used on an increasing number of blueprints. Under these conditions, it is imperative that a sound gaging policy be adapted—a policy which will enable manufacturers to fulfill the two basic requirements for a workpiece made to blueprint specifications; namely, proper function and interchangeability. In the following article, an attempt is made to call attention to all of the important factors which must be considered in the maintenance of an efficient gaging program.

The gage laboratory should be under the direct supervision of the Quality Control Manager; it should be centrally located, and air conditioned to assure proper atmospheric condition, hospital clean, properly illuminated and practically free of dust and foreign particles.

Temperature should be kept at 68 deg. F., humidity at a minimum in order to eliminate the possibility of corrosion. At times when the facilities are not in operation, the air conditioning should be left on so that upon resuming the work week no time is lost in waiting for instruments to normalize. All instruments used in this

XYZ Machine Company, Gage Inspection Department

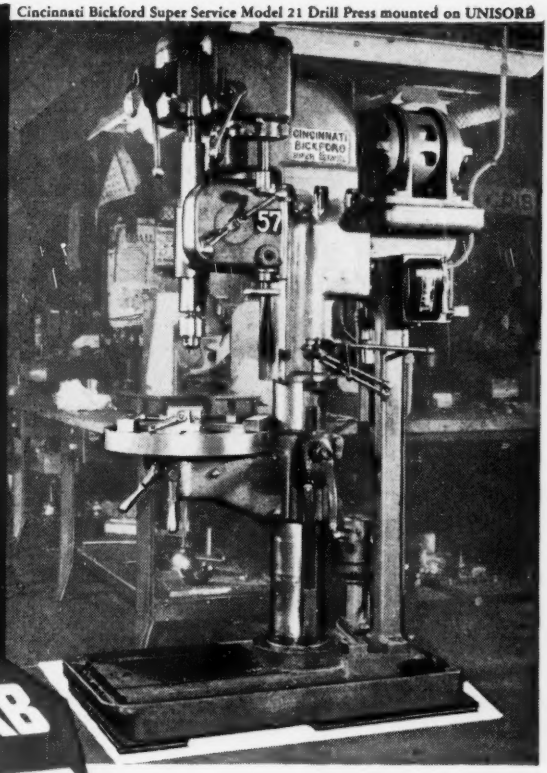
Gage No.	Dwg. No.	Part No.	Type	Size	Actual	Location	Insp. No.	Date

Fig. 1—Illustration of card on which record of gages may be kept.

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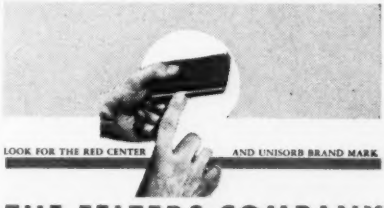
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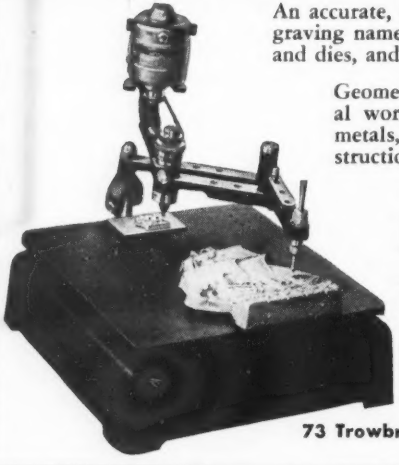
XYZ Machine Company, Gage Inspection Department

Gage No.	Size at Issue	Date Issued	Type of Gage	Date Inspected	Date Rejected	Location Crib No.	Insp. No.	Date

Fig. 2—Illustration of "working-file" card for gages recorded on card shown in Fig. 1.

room should be laid out in such a manner as to keep the sun away from them in order to avoid the possibilities of expansion and retraction. Those who consider gage inspection too expensive for their plants should consider the substantial savings in manufacturing costs and the minimum loss of time at assembly. By comparison, fifty class "A" operators can be replaced by forty class "C" operators when gages are supplied.

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Before going any further, let us discuss the function of gaging practice as it should be. A gage laboratory must be provided with the following instruments: At least one set of "AA" size blocks which should be checked and calibrated periodically by the bureau of standards, this set to be used as the basic size for comparing all other sets of size blocks throughout the shop; a measuring machine; supermicrometer; electro limit comparator, optical comparator; lead checking machine; internal comparator; tool maker microscope; optical flats with monochromatic light; at least one bench center with sine indexing face plate; Rockwell hardness testing machine; cylindrical square; and so on. Gages required in this department will be setting plug thread gages, go and not go for setting ring thread gages, wear limit check gages, as well as a master setting gage.



It will be the responsibility of this department to see that all types of gages used in the shop are constantly checked for size, nicks, scratches, and so on. Crib attendants should be notified that when a gage is returned to the tool crib, the gage should be laid aside for later pick up by the gage inspector at least once on each shift. To aid the manufacturing branch of the company, at least one mobile gage inspection unit shall visit the various departments once a day or whenever pos-

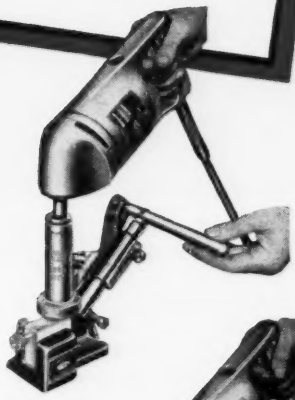
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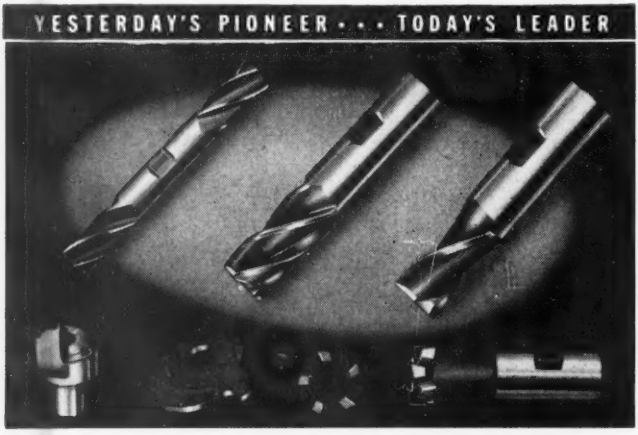
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sible. Gages worn more than 5 per cent of the total tolerance should be taken out of service and immediately replaced. All tools and measuring instruments must be checked at least once a month against master size gages, reset, and maintained in good working condition. In order to expedite production or 100 per cent inspection, this department should be called upon to design certain types of gages.

A direct link should exist between this department and the methods or planning department in order that gages, fixtures, jigs, and so on for a future job may be ordered ahead of time and ready for use when the job reaches the machining stages. All gages, taps, dies, and chasers should be ordered by this department and then inspected before they are accepted.

All gage and other items brought to this department for inspection should be left untouched for at least two hours depending on the size of the object to be checked in order to give it a chance to normalize to the room temperature, thus avoiding errors in size.

Great care must be exercised by the operator in making fine measurements. Many factors must be taken into consideration; namely, that all objects must be cleaned thoroughly and inspected with minimum handling so as to avoid trans-



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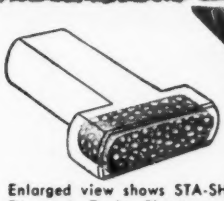
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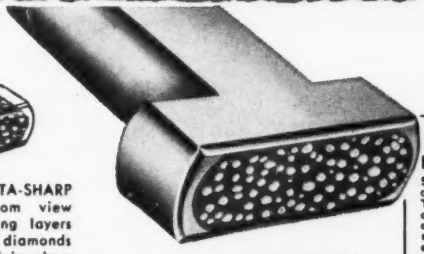
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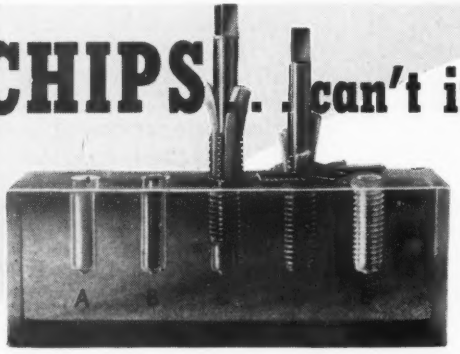
XYZ Machine Company, Gage Inspection Department

Tool No. & L	Ordered by Dept. No.	Date Received	Date Issued	Crib No. Location	Date Inspected	Date Rejected	Insp. No.	Date

Fig. 3—Illustration showing filing card of the type on which all measuring tools and instruments may be listed.

fer of heat from the inspector's hands. Natural acids from human hands tend to cause corrosion on highly finished surfaces. It is for this reason that personnel in gage laboratories should be examined by a doctor to determine whether this condition exists. Gage inspectors should be notified of all revision on drawings for gages they are to inspect. Also, the part print where

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The B&W Technical Staff will supply objective recommendations and, if you desire, your regional B&W Tube Representative —Mr. Tubes—will step in to help interpret your needs to the home office. Bulletin TB-324 gives an idea of what can be done with fine tubing. Write for it.

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gage will be used should be furnished so that a full understanding of the gage function will be given the inspector.

Many times a gage will be needed in a hurry in order to get the "hot job" out. A gage will be made in the plant and many corners will be cut. In order that quality be maintained, the gage inspector should be notified of the full tolerances on the part so that he can determine the acceptability of the gage. Let's say for example that a hole is to be bored $\frac{1.2497}{1.2500}$. The go plug gage should be 1.24976, but the not go plug gage should be 1.24934. There we would have an ideal condition. However, when a plug is made in a hurry with minimum hardness ground to 8 micro-inches, the go checks 1.2498 and the not go checks 1.24998. This should be accepted by the inspector provided that he knows of regular gages being made or on orders through the purchasing department, and that finishes on plugs and ring gages should not exceed 2 micro-inches and hardness should be 63 to 66 Rockwell "C."

Many shops have systems whereby they use a class "Y" gage in the shop and "X" gages in inspection. This is an excellent idea, however expensive it may be. But most plants prefer to use but one type of gage. This type of procedure may cause many unnecessary headaches in the assembly department. Depending upon the quality

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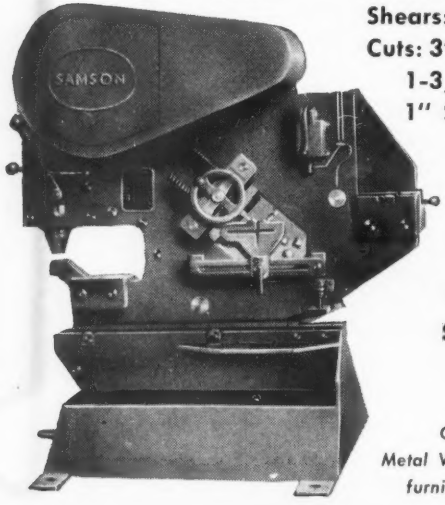
of work done, thread standard for screw work is universally accepted at class 3 for all N.C., N.F. or N.E.F. threads. This causes a terriffic burden on the gage inspection department for where it is comparatively simple in inspecting a plug thread gage, it is rather difficult to detect a worn thread ring gage, unless gage inspection is provided with a set of wear limit gages. These gages detect the wear in a ring, thus eliminating the chance of working with a worn gage. Impression with lead, or sulphur graphite can be made to inspect the ring thread gage, but this is a very slow process. Where in some plants there may be 300 ring gages of one size in use at one time, these gages must be inspected at the end of every shift, a rule that management must enforce.

A record should be kept on every gage and a number and lateral symbol applied for identification purposes. A card of the type shown in Fig. 1 should be on file permanently. A working file for the same gage, as shown in Fig. 2, should be kept in order that the life of the gage can be determined. Each type of gage should have a prefix letter. Thus a 0.1872 to 0.1875 plug gage would be No. 708P but a ⅜-16NC 3 plug thread would be No. 108T or a plain ring gage would be 108R. The thread ring would be 108TR. By the same token all measuring devices must be listed on file cards as shown in Fig. 3.

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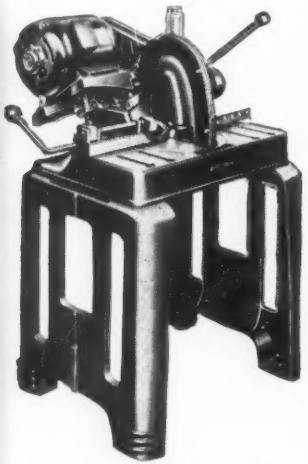
FACE MILLS

Similar cards for taps, hobs, threading dies, jigs, checking fixtures and other items should be on file in this department so that quick references can be made as to location discrepancies, size, and so on.

Personnel in the gage laboratory should be divided in three groups; namely, a class A tool and gage inspector should be able to work without supervision other than technical advice when needed. He should be able to read complex drawings, should have a good knowledge of mathematics as applied to tool and gage work, make all kinds of set ups, be able to draw charts, make initial check, should understand and use all measuring instruments.

A class B tool and gage inspector should be required to read the lesser intricate blueprints, should work under supervision, should be able to make inspection set ups on all gages, and be dependable in setting thread ring gages, snap gages, dial comparators, and so on.

A somewhat independent tool and gage inspector will be the man in the third group. This man is better known as the repair man. He should have thorough knowledge of all instruments, indicators, micrometers, vernier, and so on. He should understand the function of each tool or instrument and be able to repair it without loss of efficiency. The gage repair section should be located within the same area as



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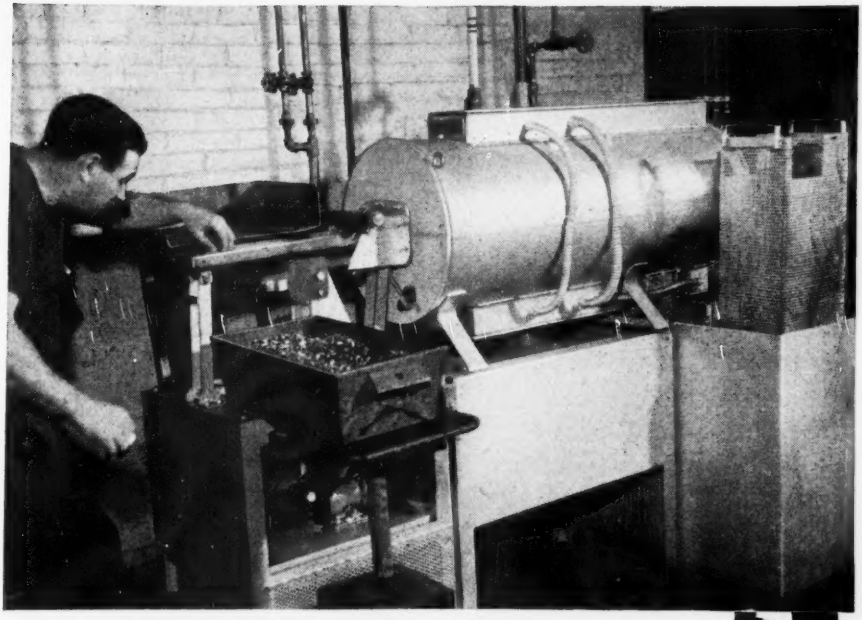
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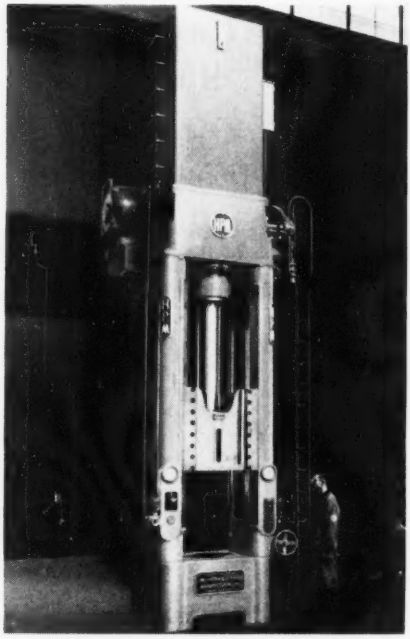
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the tool and gage laboratory but separated from it in order to prevent any grit or filings from entering the laboratory.

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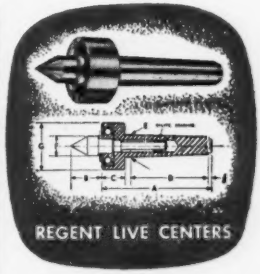
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Small diameter head • Shorter overhang • Accurate to .0001 • Free-turning point revolves with smallest parts where point of average live center will not turn • Minimum deflection due to rigid, one-piece point • Oilite bearing and ball bearing



2½", 3½", and 4½" square

Twelve positions • Re-indexes to closest measurements • All working parts hardened • Simplifies and cuts set-up time • Achieves greater productivity and accuracy • Fully protected against dirt and chips • Fits all lathes



Spring Type: Finest, select steels • Properly heat treated and precision ground • Hard jaws • Styles 3C, 3AT, 5C, and 6AT.

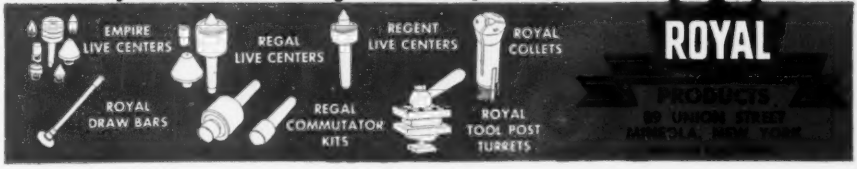
Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.



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Precision-built and engineered handwheel type • Extremely accurate • Sturdy construction, finest quality workmanship and materials • Polished maple handle • Hollow torque tube extends through spindle • ½" capacity for all popular lathes

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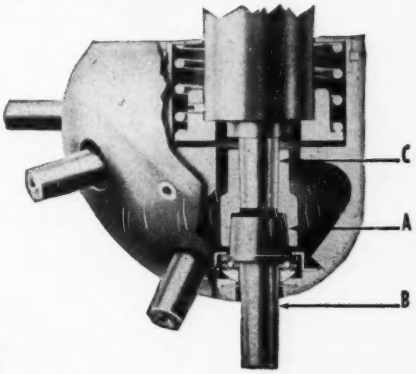
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MORE HOLES
PER HOUR — PER DOLLAR

Increase production of any standard drilling machine by adding a Lign-o-matic, the *only* drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE — Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

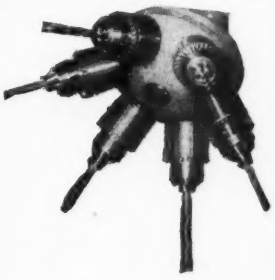
VERSATILITY— Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to ½" diameter in any material.

PRECISION — Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

GUARANTEE — May be returned in 10 days *for any reason* for full refund of purchase price. Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00
Chucks extra at established prices.

DELIVERY— Currently, 2 weeks.



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(quill dia.)..... (spindle taper).....
My name.....
Title.....
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MODERN EQUIPMENT AT WORK

Grinder Machines 35 to 40 Clutch Plates per Hour

USING a double spindle grinder (Fig. 1) recently developed by the Gardner Machine Co., Beloit, Wis., parallel sides of steel or bronze-faced clutch plates ranging from 12½ to 19 inches o.d. and measuring approximately 0.126 inch thick are being ground at a rate of 35 to 40 pieces per hour, removing 0.010 inch overall stock. Tolerances of 0.001 to 0.002 inch for parallelism and 0.005 inch for uniformity are said to be maintained.

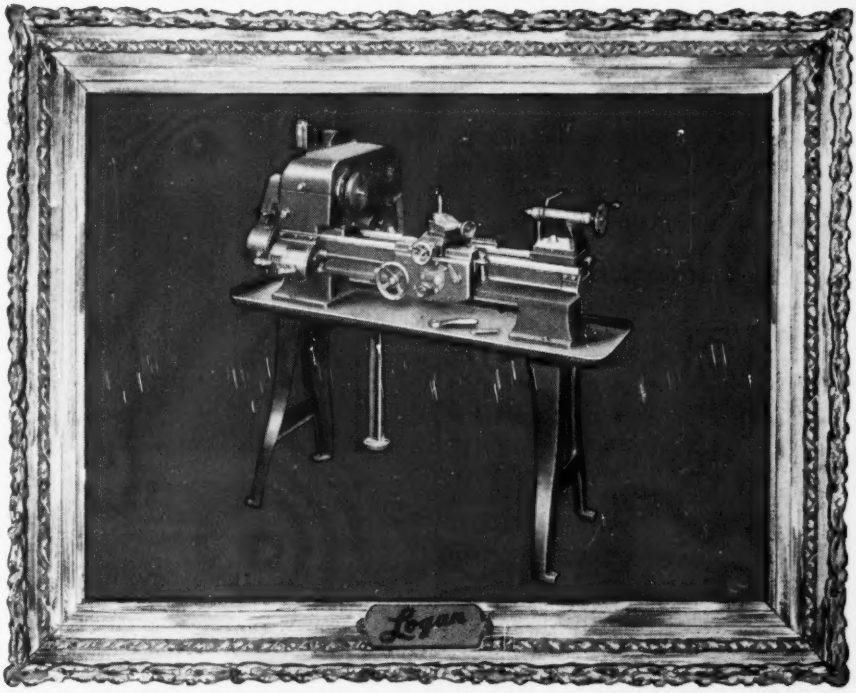
The plates to be ground are rotated between two ring-type abrasive discs. A heavy cast iron base supports the grinding head slides on dovetailed ball bearing ways. Each head with its 4-inch spindle is provided with a tilting feature which permits setting the 26-inch diameter abrasive discs at the proper angle for best grinding results.



Mounted on the front of the machine is a hydraulically operated sliding work table on which a special work-holding fixture, as shown in Fig. 2, is located. Three variable speed grooved rollers riding on the inside diameter of the clutch plate rotate it during the grinding operation. Two of these rollers are



Fig. 1—Double spindle grinder designed for grinding parallel sides of steel or bronze-faced clutch plates at a rate of 35 to 40 pieces per hour



Logan 920
Quick Change Gear Screw Cutting
Lathe 11" Swing, 1" Collet
Capacity, 1⅜" Spindle Hole 24"
and 36" Between Centers

THE PICTURE OF VERSATILITY

A *Logan* LATHE

Accurate in Every Lathe Operation

With Logan Lathes you are ready for every type of lathe operation. Heavy cuts, tool room precision jobs, high speed production runs and large volume second operation work are all routine Logan assignments. Versatility is inherent in the Logan ball bearing spindle with its wide speed range and sustained accuracy; in the accurate, rugged overall construction of Logan Lathes; and in the full line of Logan Lathe attachments. 11" swing, 1" collet capacity and 1⅛" spindle hole are typical of the specifications which make these accurate Logans capable of handling a high percentage of any shop's lathe turning. Easy to set up, simple to operate, frugal with power and durable, Logan Lathes economize every way you use them. In fact, no other lathe of comparable specifications can match the Logan in economy.

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LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

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power driven and the third roller is movable so that it can be released to permit easy loading and unloading. The work is ground wet.

After loading the work-holding fixture, the operator starts the fixture rotating and advances the hydraulic table until the plate is partially between the abrasives. The grinding heads are then fed in hydraulically as the plate revolves. When grinding is completed, the heads are opened, the fixture is withdrawn, and the clutch plate is unloaded.

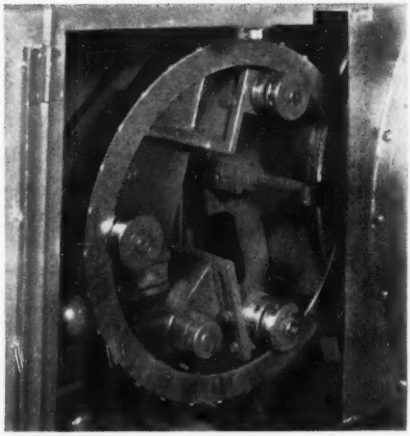
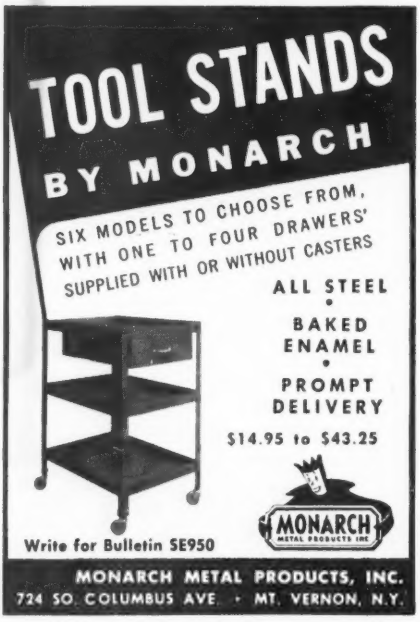


Fig. 2—Close-up view showing clutch plate mounted on special roller fixture used in feeding the revolving plate between the abrasive discs of the machine

Universal Machine "Climb-Cuts" Gears

THE "Cima" Gear Hobbing Machine for spur, spiral and worm gears, recently introduced to the American market by the Geo. Scherr Co., Inc., New York 12, N. Y., is designed for "climb-cutting." The accompanying illustration shows a spur gear (left) and









THE automobile industry created and grew with "planned production efficiency". From a large automobile manufacturer, a leader in production efficiency, comes the story showing the reason for an industry-wide switch to ERICKSON precision holding tools.

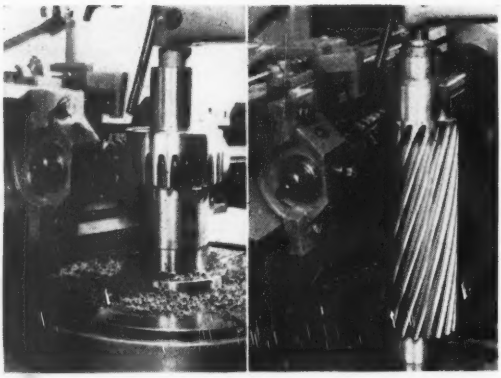
". . . Since installing ERICKSON collet chucks on all machines last year, we have reduced a breakage of 20 drills per day (as high as 40 when forgings were hard) to less than 3 or 4 broken drills a day. The full grip of ERICKSON collet chucks stops drill chatter and whip. Also, they permit the use of longer drills and drill stubbing giving greatly added drill life. The above figures are based on an average of 1200 crankshafts a day.

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2. **Grip along entire length of collet.**
3. **Replace 7 standard single-purpose collets.**
4. **Grip on drill flutes; permit stubbing and use of broken drills.**
5. **Permit use of greater feeds and speeds.**
6. **Prolong tool life.**
7. **Reduce set up time.**

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DIVISION OF THE ERICKSON STEEL COMPANY
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Spur gear (left) and helical gear (right) being machined by "climb-cut" method

a helical gear (right) in the process of being cut by this method in which the hob starts cutting on the bottom of the gear and is fed upward.

The chip produced in "climb-cutting" is thick on the top and thin on the bottom. Since there is a minimum of material to be removed at the bottom of the cut, a high quality finish is produced on the tooth flanks. The method also permits a high rate of feed per revolution of the hob without impairing the finish or accuracy of the teeth. The machine is of the universal type, for spur gears, and is furnished with a differential mechanism for the simplification of cutting spiral gears. The cutter head is arranged for tangential feeding for generating multiple-start worm gears with accuracy and full contact without ridges on the tooth flanks. Worm gears may be generated by means of fly cutters. Due to the tangential feed



This reamer averaged

1,800 HOLES PER GRIND



...without loss of accuracy or finish!

The hole in the base of a projectile must be reamed to extremely close tolerances, both as to size and finish. Not every reamer can give you good results in these 1040 steel forgings without frequent regrinding. In tests on the set-up illustrated above, no other reamer equalled the performance of *Cleveland* High Speed Adjustable Reamers! These superior tools consistently averaged *1,800 holes per grind* without sacrificing accuracy or the requirement for a smooth finish of the hole. You too can get MORE HOLES PER GRIND with *Cleveland* Reamers. One of our Service Representatives will be glad to make arrangements for a test in your shop. Contact the nearest Stockroom, or . . .

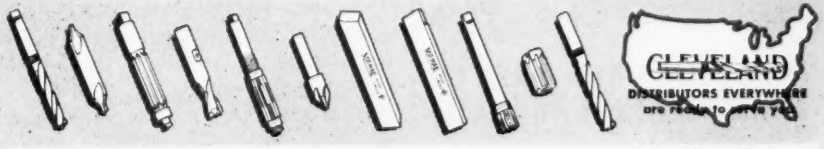
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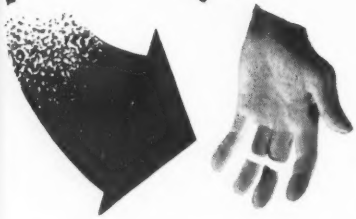
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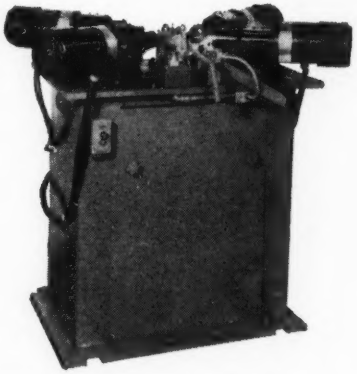
Especially written for safety inspectors and maintenance supervisors directly responsible for the safety of press operators, "Power Press Protection" is yours for the asking. Contains valuable information on the maintenance and safe operation of power presses. Send for your copy today.

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head, single or multiple thread worms can also be produced on a production basis. For this purpose, the worm blank is placed on the hob arbor and a gear generating cutter on the work arbor.

Machine Drills Five Holes Simultaneously in a Brass Ball

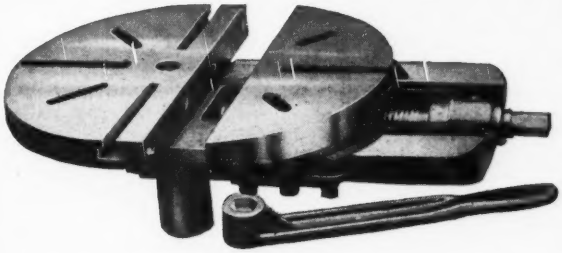
FOR performing the difficult operation of simultaneously drilling five holes in a small brass ball, the Govro-Nelson Co., Detroit 8, Mich., has designed the machine illustrated herewith, which incorporates four drilling units mounted horizontally to drill four holes of 0.140-inch diameter, and also one drilling unit mounted vertically for drilling up from the bottom a 0.154-inch diameter hole in the small brass part. The operator loads the part manually. After the drilling operations, the manual unclamping of the part automatically ejects it into a chute.



Setup for simultaneously drilling five holes in a small brass ball

With this setup, the five drilling operations are completed at a rate of one part each four seconds.

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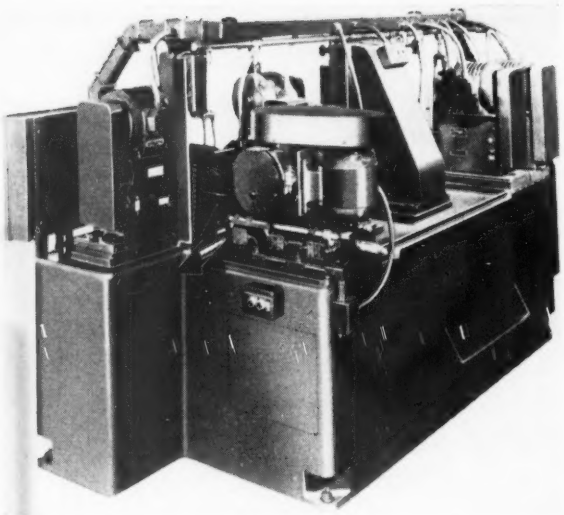
Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.



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Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

MODERN MACHINE TOOL CO.
Jackson, Michigan



This in-line transfer machine is designed to automatically machine, cut off to accurate length, and finally chamfer both ends of bar stock pieces at a high rate of speed.

In - Line Transfer Machine Performs Variety of Machining Operations

AN automatic transfer machine of the progressive in-line type developed by the Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, is designed to permit many different types of machining operations to be performed on bar stock prior to cutting to length.

With the particular setup illustrated, solid cold drawn stock is fed hydraulically to the first station where the stock is drilled from both sides. At the second station, the drilled hole is countersunk. The third and fourth stations provide for broaching of flats on both sides of the stock. The fifth station includes a circular saw head which rapid traverse approaches to cut to accurate length a section of the machined stock held by a transfer unit, and then rapid traverse returns. The hydraulic transfer unit, holding the machined and cut-off piece, returns to position on the side where two drilling units feed to adjustable stops, chamfer both ends of the piece simultaneously, and rapid traverse return. The hydraulic transfer unit then returns to the in-line position of the bar stock, ejects the completed piece to a chute, and receives the next section of bar stock to be cut off. This machine is claimed to handle 300 differential pinion shafts per hour at 100 per cent efficiency.



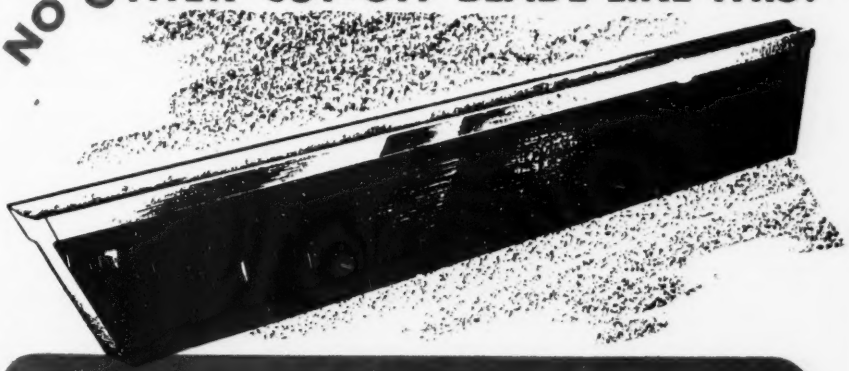
Marvel TOOL HOLDER

reduces setup and boring time to an absolute minimum. Its sliding head vertically adjustable, holds boring bits in rigid parallel alignment with the axis of bore. This assures positive clearance over the entire length of bit shank, even in holes as small as 1/16" diameter.

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None can do what **EMPIRE'S**

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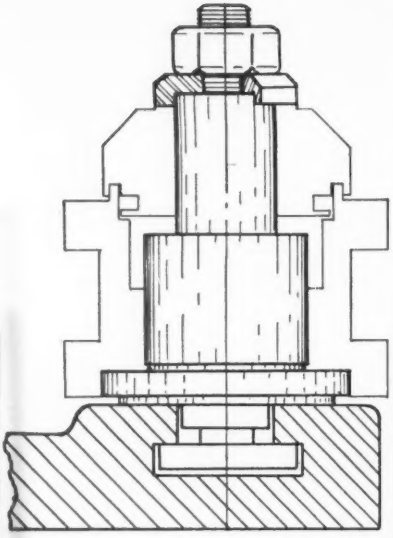
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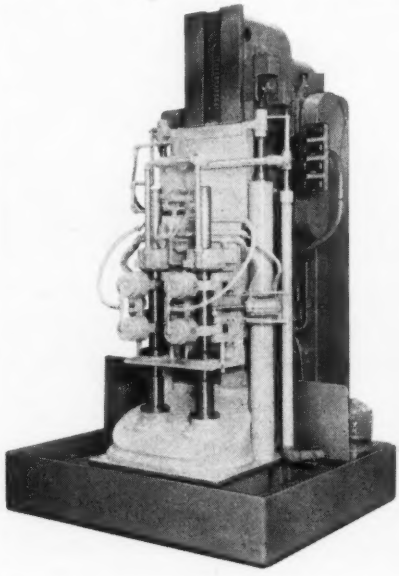
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LYNN MANUFACTURING CO.

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Machine Bores and Counterbores 56 Mortar Shells Per Hour

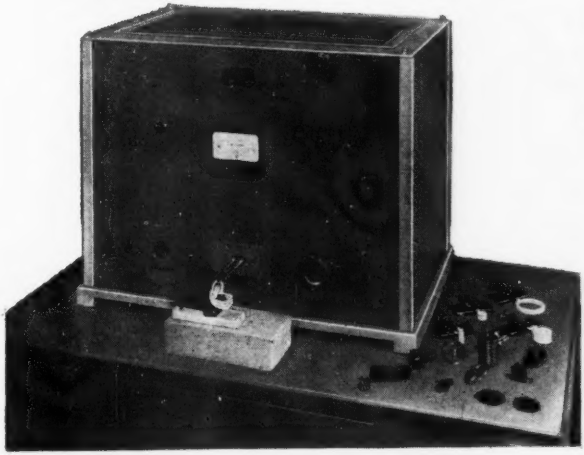
INCREASED production is said to be attained in boring and counterboring operations on 4.2-inch chemical mortar shells with the recently developed Baker Model 30 HO Boring Machine illustrated herewith, product of Baker Brothers, Inc., Toledo, Ohio. Capable of producing 56 parts per hour at 100 per cent efficiency, the machine is of the high speed, heavy duty, two-spindle inverted type, utilizing hydraulic feed. The machine is designed for No. 6 Morse taper drills, with provision for the use of pick-off speed change gears. The Oilgear hydraulic feed pump is arranged for individual motor drive, and the gearbox, located



This machine is designed to bore and counterbore 4.2-inch chemical mortar shells at the rate of 56 per hour at 100 per cent efficiency.

Lepel presents

A Low Cost PORTABLE HIGH FREQUENCY Induction HEATING UNIT



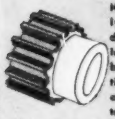
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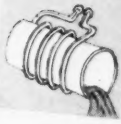
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This versatile unit is priced so low that every shop may now take advantage of modern induction heating techniques to improve quality and to increase production. Its simplicity of operation eliminates the need for skilled personnel.

The Lepel Model 2 KW will meet the requirements of machine shops, toolrooms, research laboratories and educational institutions. It is especially suitable for hardening, brazing and soldering small parts of either ferrous or non-ferrous metals.

Complete unit with line connection and load coil.

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WILL HEAT TO 1500° F.

1/8"	steel rod 1" length in approx.	1 second
1/4"	" " " " " "	3 seconds
1/2"	" " " " " "	15 seconds
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Will melt 4 ounces of brass or steel in 4 minutes.
Equally well suited for heating of non-ferrous metals.



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in the base of the machine, is equipped with a self-contained lubricant pump for lubrication of the gear train and bearings.

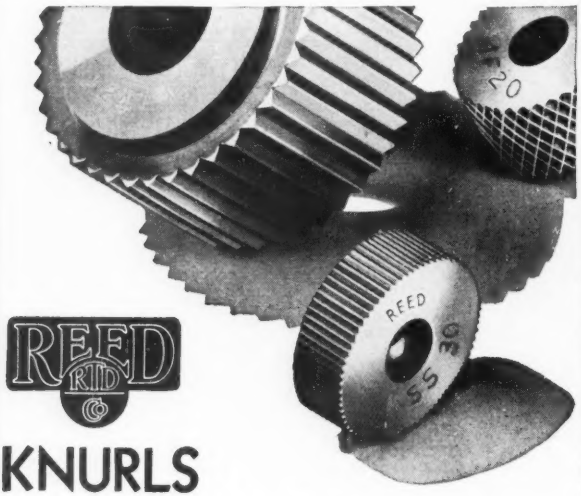
The operating cycle of the machine involves the chucking of two shells; locating of shells over spindles from fixed V-blocks, one at the upper and lower end of each shell; boring a 3.73-inch hole to 15-inch depth of cut; and counterboring a 3.74-inch diameter hole to $\frac{7}{16}$-inch depth of cut.

Equipment Processes Suspension Supports for Army Tanks

FOR processing suspension supports for Army tanks, the Buhr Machine Co., Ann Arbor, Mich., has designed and built a special five-way hydraulic-feed drilling machine with individual lead-screw tapping. The work-holding fixture is mounted on a carriage and is transferred manually from station to station as 11 drilling and chamfering operations and 9 tapping operations are performed. One of the interesting advantages of this fixture is that at each station it is electrically interlocked with the machining cycle. Whenever the fixture is not properly positioned, the forward cycle of the machine cannot be started.

All hydraulic and electrical installations on the machine are said to conform with Joint Industry Conference standards. Machine ways are of tool steel, hardened and ground, and are automatically lubricated.

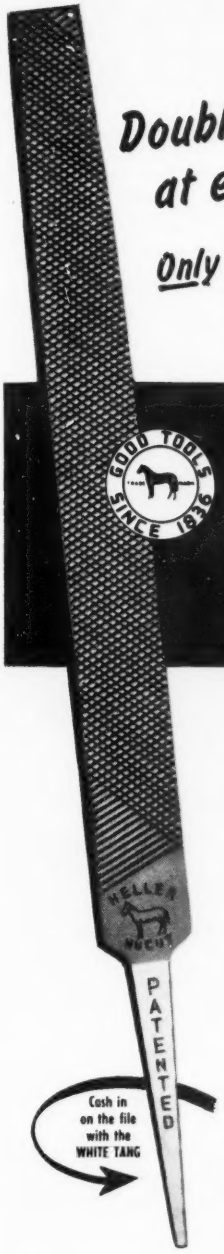
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Double-duty filing at every stroke!

Only Heller NUCUT gives it to you





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WITH A NUCUT YOU FILE MORE, FASTER, BETTER WITH LESS EFFORT

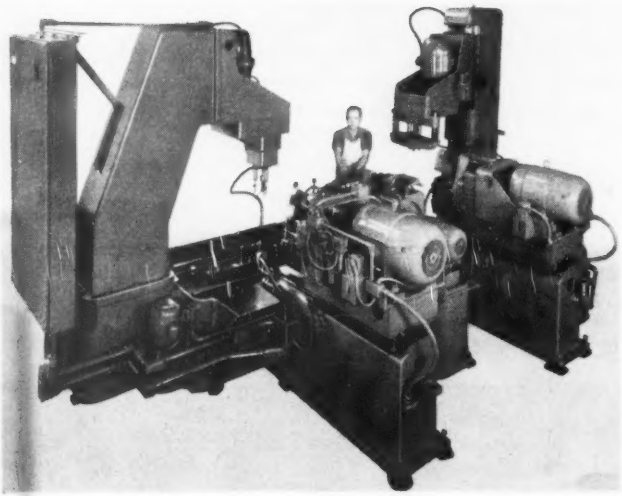
NUCUT files are *different.* You can *see* the difference. Just hold the file at an angle—and you'll spot the exclusive wavy pattern made by NUCUT'S *two* sets of teeth. It's this patented wavy construction that gives you superior cutting power.

The teeth do two jobs at every stroke. The coarse teeth cut fast, clean, without skidding. The fine teeth leave the surface smooth. Just as if two files were working at every stroke.

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chine, as shown in the accompanying illustration, is as follows:

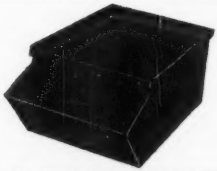
Station 1 — Vertical — combination drill and chamfer for (3) ½-13 tapped holes. Horizontal — combination drill and chamfer (4) ½—13 tapped holes, and drill (2) ¾-inch diameter holes.

Station 2—Vertical—idle. Horizontal — combination drill and chamfer for (2) ½-13 tapped holes.

Station 3—Vertical—tap (3) ½-12 holes. Horizontal—tap (6) ½-13 holes.



"Stack Up"



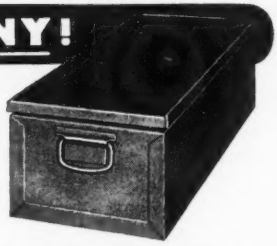
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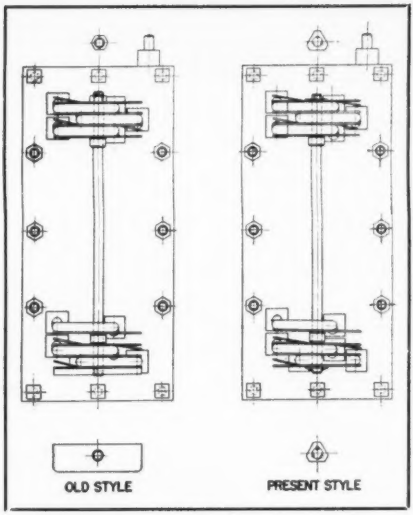
CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

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STEELWELD PIVOTED BLADE SHEARS

New Fastener Conserves Materials and Reduces Heater Assembly Costs

THE Grinnell Co., Providence, R. I., reports that the use of triangular self-locking Waldes Truarc Retaining Rings has enabled the company to cut down on the use of scarce raw materials in its Thermolier unit heater. A threaded cast iron tube rest (which was formerly used to support a thermal tube tie rod at the bottom) and a jam nut at the top of the rod have been replaced by a plain rod and two of the above mentioned rings, which are manufactured by Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N. Y. The rings require no grooves but are simply pushed into place, holding firmly.



To conserve vital raw materials in the construction of Thermolier unit heater, the threaded cast iron tube rest formerly used to support a thermal tube tie rod at the bottom, and a jam nut at the top of the rod (left illustration) have been replaced by a plain rod and two Waldes Truarc Rings (right illustration).

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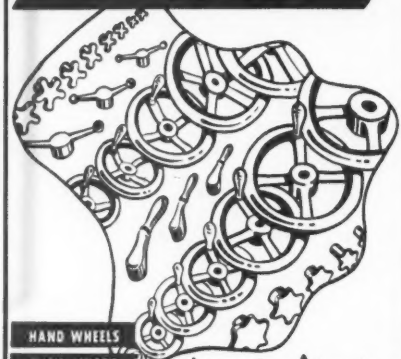


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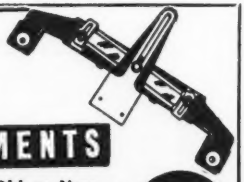
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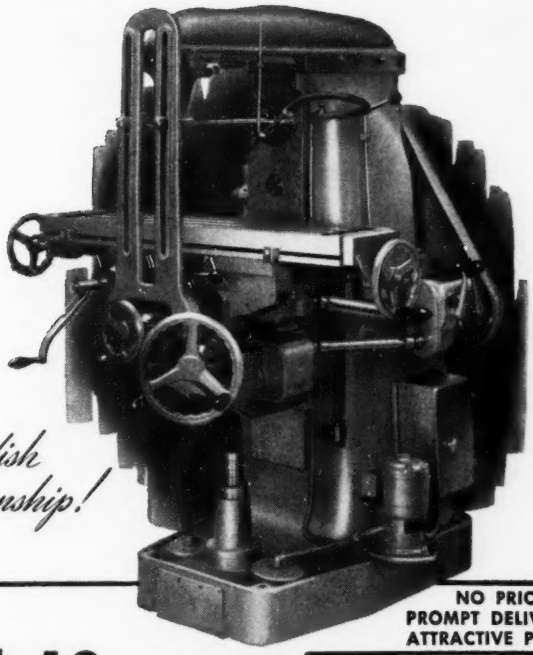
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Precision, Anti-friction bearings throughout.

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CONDENSED SPECIFICATIONS:

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Table Movements:	
Longitudinal	24½"
Transverse	8¼"
Vertical	19"
Spindle Speeds	12
Spindle Speed Range	36-1540 RPM
Table feeds	12
Taper in spindle	No. 40 NMT
Main motor	3 HP

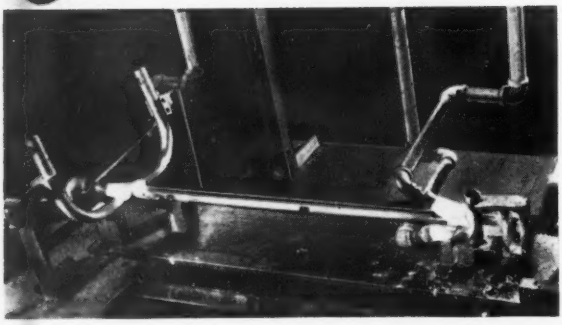
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(Above) "Cat Skinner, Jr." hauls a pal to the next job. (Below) Brazing station with "tractor" frame under heat from high temperature radiant gas burners at F. C. Castelli Company.

In addition to vital raw material conservation, labor time has been reduced considerably in the assembly of the heaters, according to the Grinnell Company. These economies, according to company officials, have resulted in a 52 per cent reduction in material and assembly costs.

Gas Brazes "Tractor" Frames at High Speed

HIGH speed and rugged construction are the prime considerations in one production schedule of 14,000 "tractors" a month. That schedule does not quite meet the demand for these tractors - - - by little boys all over the country. Riding-model tractors, that pull trailers, have become highly popular automotive equipment with the "cat skinners" in short-length jeans.

Heavy-gauge tubing and a bracket — the frame components that have the strength required to withstand the pounding the tractors receive in operation— are brazed simultaneously in 45 seconds by high temperature radiant gas equipment manfactured by Selas Corporation of America, Philadelphia. Each and every hour of the production day, 116 tractor frames are brazed in the plant of F. C. Castelli Company, also in Philadelphia. Quality tests of the brazed frames have revealed that the brazed joints are at least as strong as any other part of the frame. Precision-controlled heating equipment burns an accurately proportioned mixture of gas and air within ceramic gas burners that deliver uniformly high temperature for a smooth distribution of the brazing alloy.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



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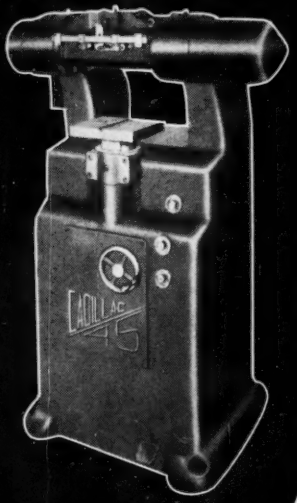
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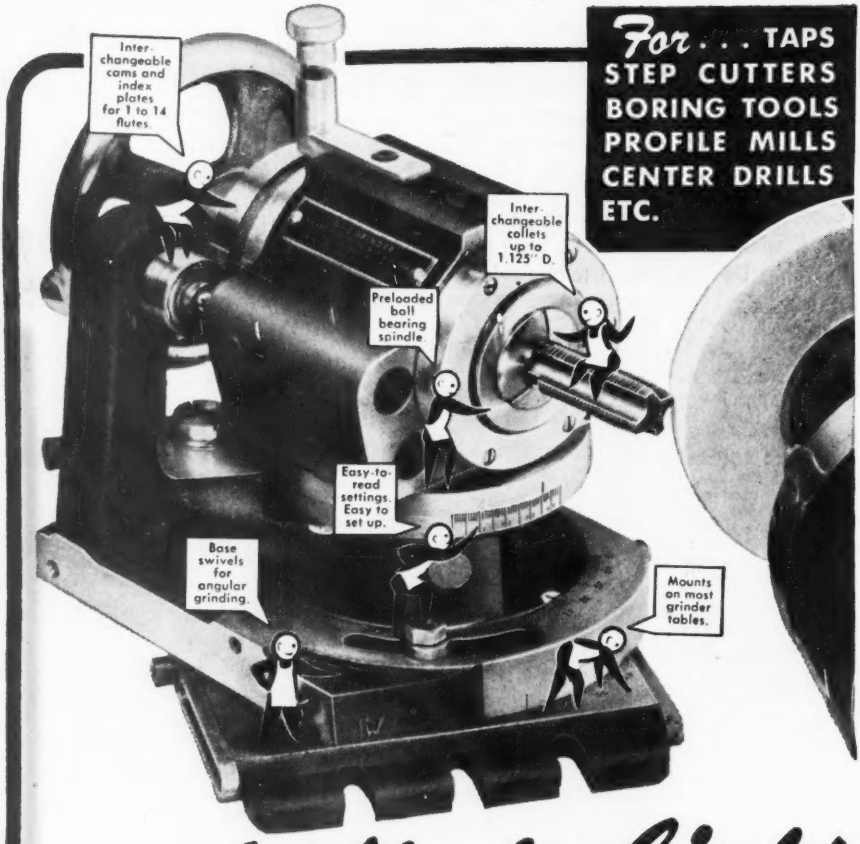
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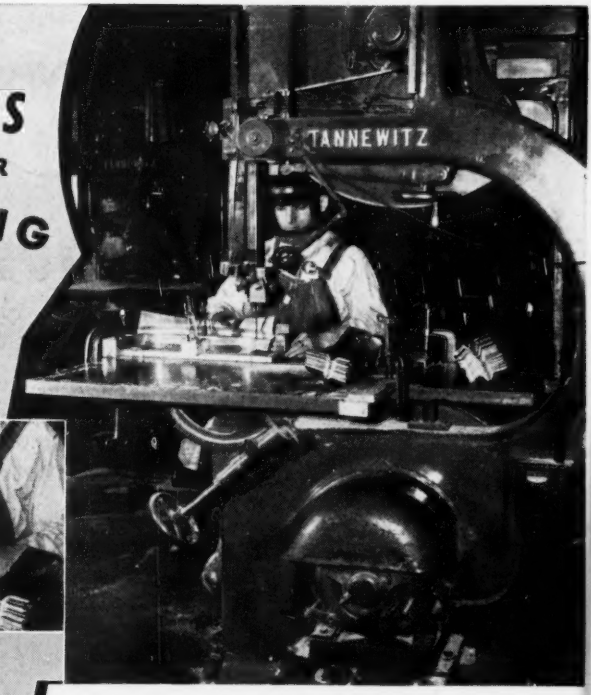
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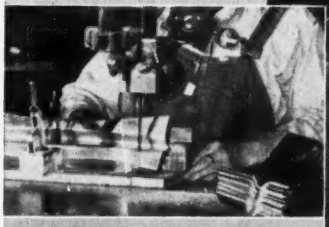
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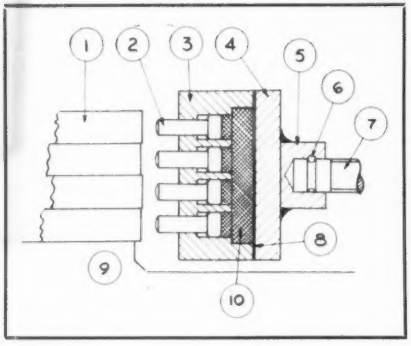


IDEAS FROM READERS

Clamping Jig for Stack Drilling Uses Silicone Bouncing Putty

By H. G. Frommer

TOOL designers often have need for a simple equalizing clamp which can be used for the simultaneous clamping of several parts. Frequently, it is highly desirable, because of time savings, to stack-drill flat parts, such as castings or flame-cut plates. Time savings result because of lower loading and unloading times, single approach and return of the drill, single movement to turn the machine on and off, and—if an equalizing clamp is used—one clamping operation instead of several. Since castings or flame-cut parts are never exactly alike, it is usually necessary to clamp each workpiece separately to assure accurate results, safe operation, and to prevent damage to the drill or reamer used.



Cross-sectional sketch of stack-drilling clamping jig utilizing Silicone Bouncing Putty

Tool design manuals and trade journals have often shown clamps which provide methods for the equalized clamping of several parts, the designs ranging from multiple leverages to cages containing rollers or balls. Having tried several of these suggested designs, we have found them to work fairly well. They are, however, costly, delicate, and become overly complicated when the number of workpieces to be clamped simultaneously exceeds four. The clamping jig to be described in this article is simple, inexpensive, rugged, and will withstand the high speeds and feeds required today. The principle used is simple; namely, a small chamber with four pistons which are backed up by a pliable, non-compressible medium. Any pressure exerted against one piston only will push out the other pistons until they all find

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(Railway Switch Heaters)

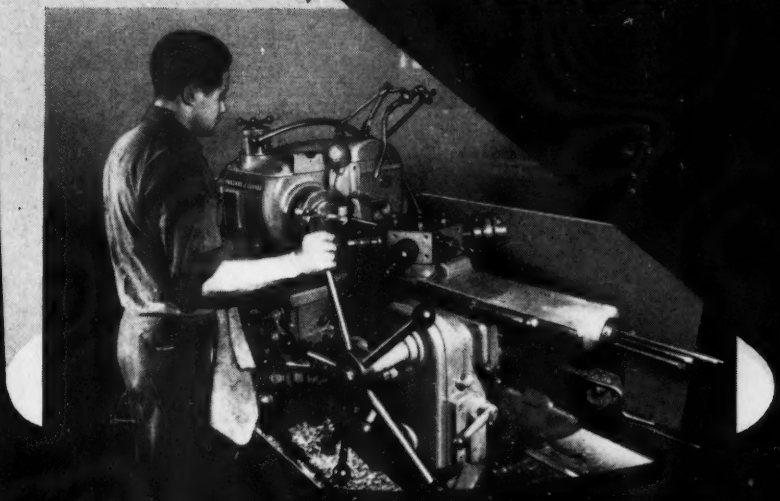


Photo Courtesy of Westinghouse Electric Corporation

Former production of connectors for example was 71 parts per 8 hour day. After installing the Model #5, BARDONS & OLIVER, Turret Lathe, production was increased to 122 parts per 8 hour day—showing a 72% saving.

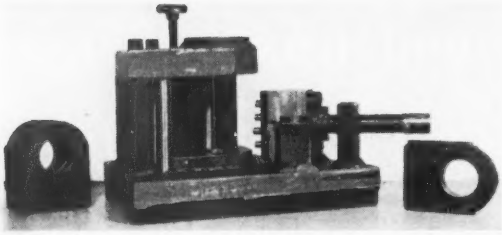
Five tool stations and both front and rear cross slides of the machine are used. Operations include: Feeding the Stock, Turning, Centering, Drilling, Counter Boring, Threading and Cutoff.

This installation at Westinghouse Electric Corporation is typical of scores of production increases and improvements throughout the country with newer BARDONS & OLIVER equipment.

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Empty jig with workpieces alongside. The three vertical pins extend from the top plate to the base and serve as locators. This type of locator permits the jig boring of all holes in one operation without repositioning the jig on jig borer table and facilitates the manufacture of such jigs.

resistance. Thus, a true pressure equalization is reached. Hydraulic fluid or grease could well be used as a medium, but sealing problems would increase the cost, require much greater accuracy in building the unit and, last but not least, would increase the size of the clamping unit to impractical proportions.

In the search for a practical solution, we stumbled upon General Electric's Silicone Bouncing Putty, a comparatively new product and readily available at but a few cents per pound. This putty flows under pressure but will not leak through adjoining surfaces as easily as oil. When the putty does leak, it does so at an extremely slow rate. Bouncing Putty is not affected by temperature and behaves rather interestingly otherwise. When pulled apart by hand, it acts like well-chewed bubble gum and yet, when rolled into a sphere, it bounces better than a rubber ball. When subjected to sudden blows, it shatters like glass and, left on a table, it will flatten

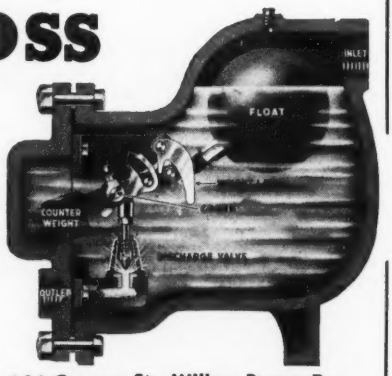
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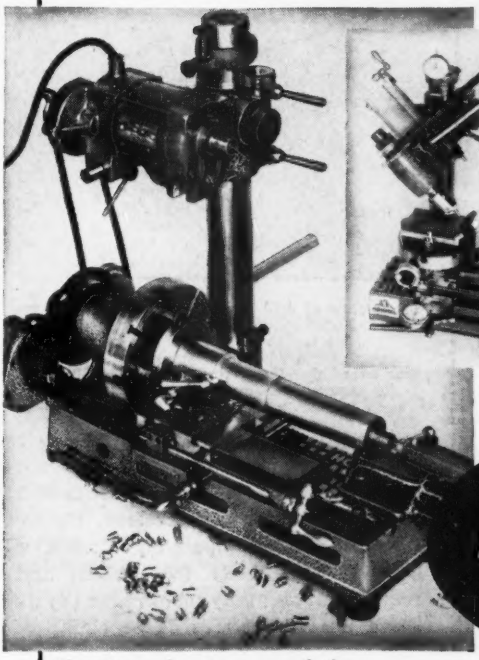


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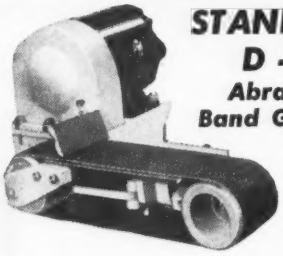
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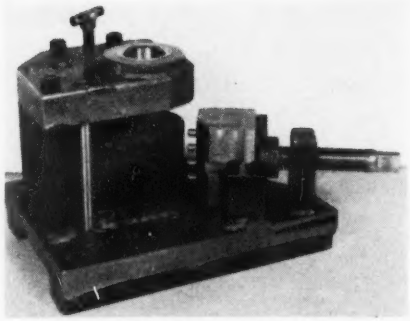


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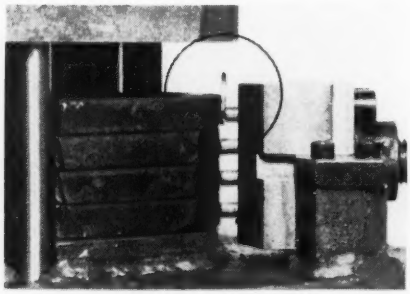


Front view of drill jig with four workpieces inserted. Note keyway on side of clamp body for rail guides to prevent rotation of clamp. After thorough tests with high speeds and feeds, it was found that the T-screw on the top plate of jig was superfluous and was eliminated.

out in the course of time.

This putty was used as a medium because of its flow characteristics and its resistance to compression. Referring to the accompanying sketch, a hollow clamp body **(3)**, drilled and reamed for as many piston pins **(2)** as there are workpieces to be clamped, was screwed to a cover **(4)**. The body was provided with keyways on its sides to permit free longitudinal motion within a rail. Screw **(7)** moves the body, with help of tangential pin **(6)**, against the workpieces **(1)**. The piston

This close-up view illustrates the equalizing action of the jig. Note the ⅛-inch shim under the top pin to represent a larger workpiece. Equalizing action is fast and reliable.



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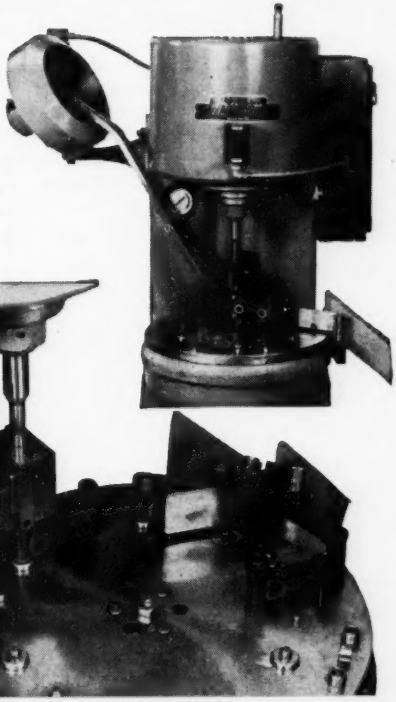


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NUT DRIVERS and SPECIAL ASSEMBLING MACHINES



Here is a typical case where a D.P.S. Motorized Hopper Unit, adapted to a standard hydraulic press, materially reduces manual operation. Bushings are selected and fed in the hopper, and delivered to a special pair of holding fingers beneath the ram of the press prior to pressing the bushings into the casting. Previously it was necessary to insert the bushing manually into the proper nest beneath the ram and cycle the press by hand. The new D. P. S. method provides an automatic cycle on the dial of the press, reducing the operator's effort to merely placing the casting on the fixture provided on the face of the dial, the rest of the cycle being automatic.

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DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST. **DETROIT 16, MICH.**

pins (2), made of drill rod, are shouldered to prevent their being pushed out of the body completely. A paper gasket (8) eliminates the need for very smooth surfaces between body and cover. (10) denotes the Bouncing Putty and (9) represents the jig base. The screw (7) may be operated by a crank or ratchet wrench (not shown), or air or hydraulic power may be used as well. The test jig shown in the illustrations has performed extremely well, and we were able to use the heaviest feeds and speeds permissible for the type of work.

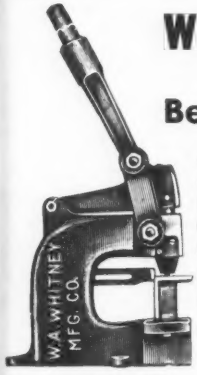
With a bit of imagination, the tool engineer will find many applications for the Bouncing Putty in clamping, damping, or equalizing problems.

Forming Die for Stock of Variable Thickness

By Federico Strasser

THE bottom (female) die **A** is of standard design and solid construction, being made from a steel block. It is mounted on a die shoe, **B**, and includes two nesting plates, **C**, and a spring-actuated holder pad, **D**, which also serves as an ejector. The punch is of sectional design, with few parts, two of the parts being movable with respect to the other parts. The punch holder **E** carries a driving wedge, **F**, which is provided with two 45-degree inclined planes. Two half punches, **G**, are mounted in a floating manner in the punch holder and are held in position by means of two dowel pins, **H**, and two guiding plates, **I**. In the open position, two strong springs, **J**, push down the half punches.

In operation, the straight blank is placed in position on the holder pad **D**



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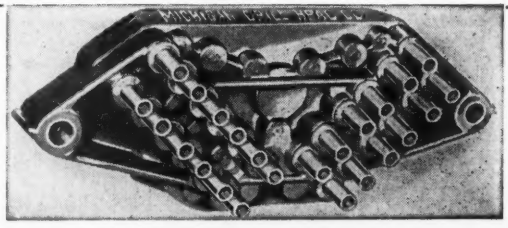
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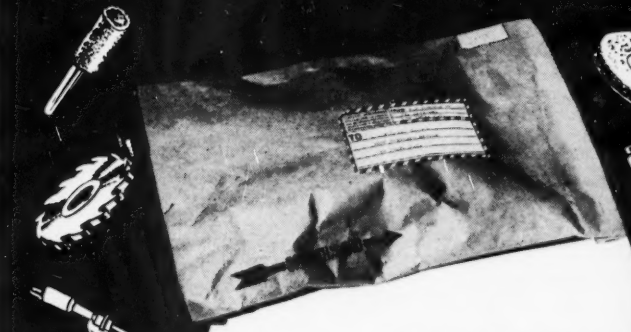
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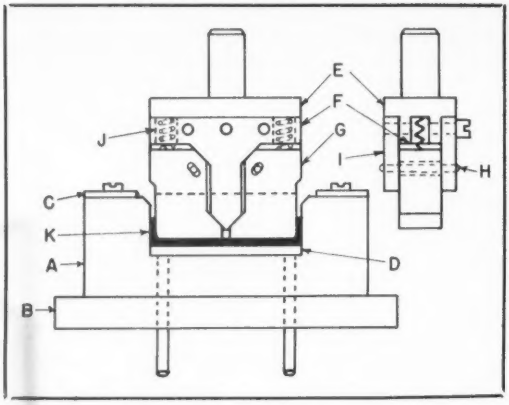
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Sketch of die for forming stock of variable thickness

between the two nesting plates **C**, and the punch is lowered, pushing the blank into the die **A** and forming it to the desired U-shape. As soon as the holder pad **D** reaches the bottom position, the punch, of course, cannot descend any farther; however, under the influence of the downward pressure of the press ram, the driving wedge **F** forces the half punches **G** sideways (this lateral movement being possible due to the elongated holes in the half punches for the dowel pins **H**) so that the two legs of the workpiece **K** are pressed firmly against the side walls of the die **A**. In this manner, any variation in stock thickness is compensated for readily.

A die of this design, of course, can only be used with flywheel presses since the stroke (i.e., the bottom position of the press ram) cannot be fixed.



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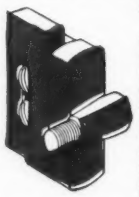
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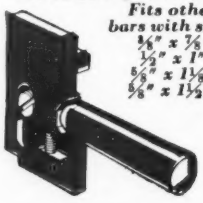




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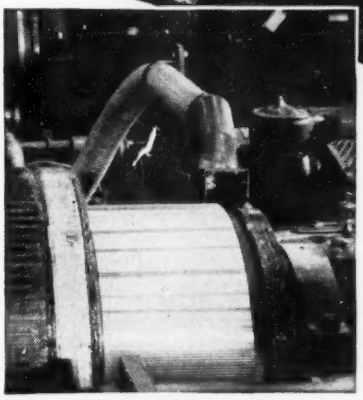
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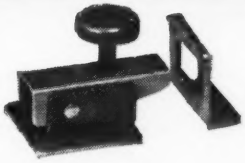
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Poke him off balance with your left, then let him have it with your right. That's good boxing and, in the setup pictured here, good dust collecting.

On this commutator grinder a problem of turbulence and heavy dusts was solved with a Torit No. 84 Dust Collector and dual hooding. Here the lower hood sort of pokes the dust off balance so it's a sucker for the one on top . . . and dust no longer prevents accurate turning of the commutator.

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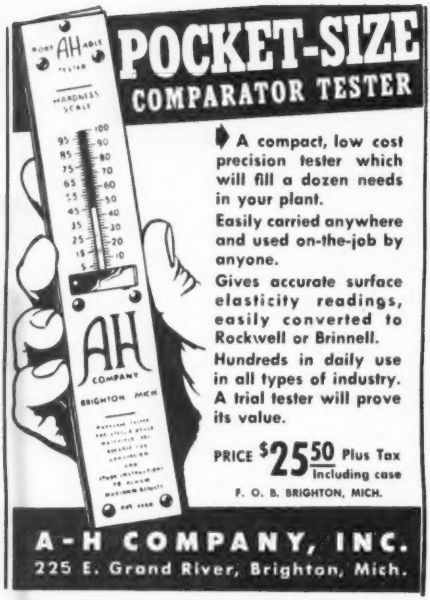


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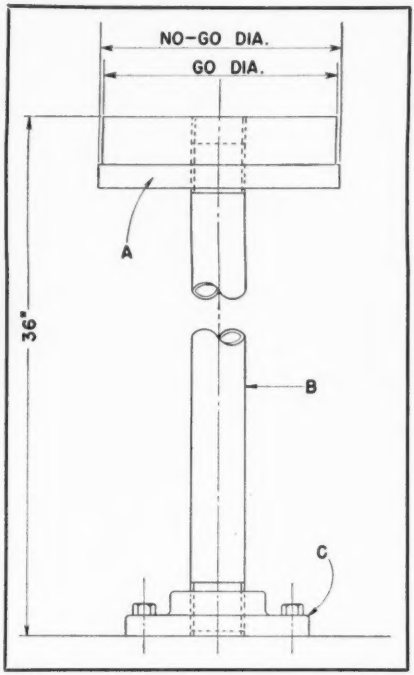




Floor Gage for Checking Rolled Tube Diameters

By Irwin Mansfield

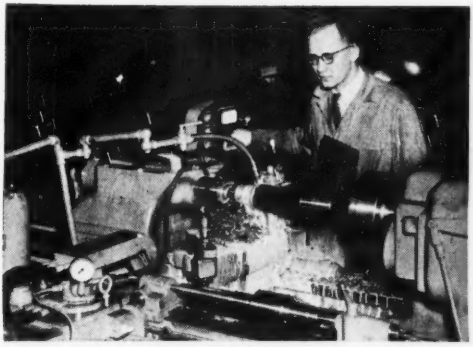
WHEN rolling large sheet metal tubes which must be held to rather close tolerances, a simply constructed floor gage like that shown in

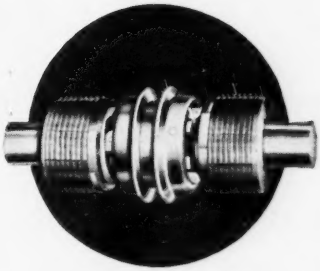


Sketch of floor gage for checking rolled tube diameters

the accompanying sketch will serve effectively for checking the diameters of finished tubes. The gage consists of a gaging member, **A**, made from hardened steel which machined with "go" and "no-go" diameters, as shown. A hole is tapped in the center of the gaging member to accommodate one end of a 36-inch length of standard

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pipe, **B**, the other end of which fits into a standard pipe flange, **C**, that can be bolted directly to the floor.

To use, the floor gage is installed near the rolling machine where it will be within easy reach of the operator. After a tube has been rolled, it can be quickly and easily slipped over the gage by the operator for determining whether or not the finished tube is of the correct diameter.

Fixture for Surface Grinding the Ends of Pins

By John E. Hyler

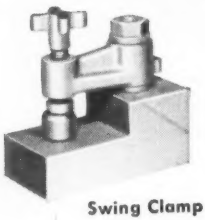
A CONVENIENT method for surface grinding the ends of pins of varying diameters and of bringing them to required net length in the process involves the use of a pair of special V-blocks as shown at **A** and **B** in the accompanying sketch. These V-blocks are each machined with two slots at the ends of the vees, the four slots being employed to accommodate short pieces of flat bar stock with a firm press fit, as shown at **C**. The V-block **A** is drilled and tapped at two points and the V-block **B** drilled and countersunk at similar locations to receive two screws, as indicated at **D**, which are used to draw the two blocks together on the pins to be ground and to loosen the blocks for loading and unloading work.

A handy way in which the fixture can be tightly loaded without exercising much torque on the screws **D** is

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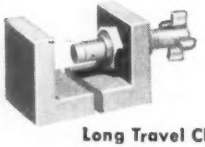
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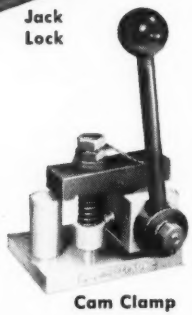
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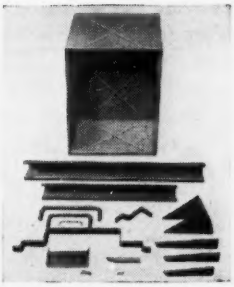


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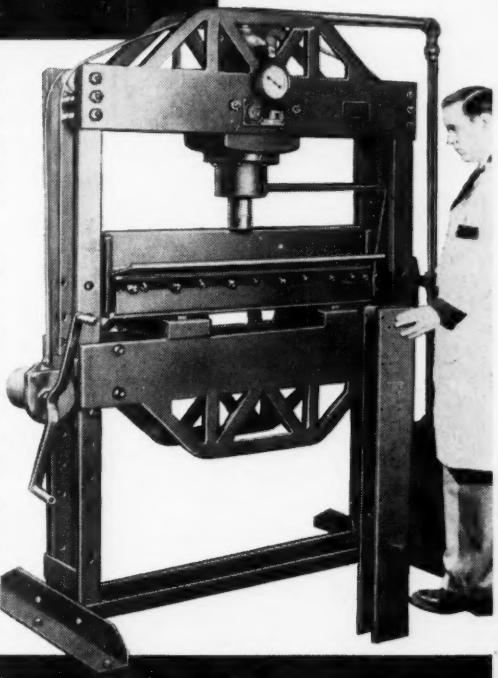


Here's the line-up . . .

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Gross Machinery originally bought this 75 ton KRW motor driven hydraulic press to form cylinder ribs of 14 gauge steel for their dry cleaning tumblers (second and third from top in photo above). Formerly made by hand, each rib required 12 minutes to form. Now the press does the *same job in 1½ minutes.*

But that was only the beginning. The press soon began poking its nose into every problem in the plant. It gave them a 50% increase in production of filter plates for their tumblers. The lint-collecting drawer (at top in photo above) used to rattle. Gross had almost decided to make these drawers out of heavier gauge, more expensive steel. But then they found that criss-cross ribs formed by their KRW press eliminated the trouble. Brackets for the tumblers, corner inserts for the tumbler hoods, clips for holding wire and tubing on the tumbler — all these jobs are now made faster, more accurately on this versatile KRW press. Earl Westphal, general production superintendent at Gross, says: *"We bought this press late in 1950 and it's paid for itself ten times over."*

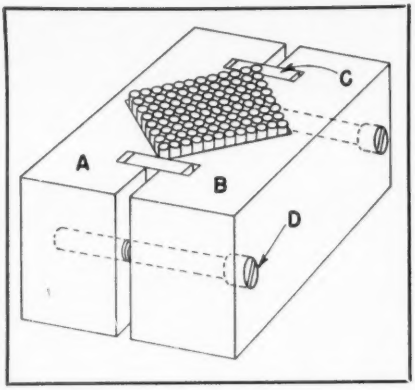


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to provide two or three pins somewhat shorter than the ones being ground for use as "tighteners." These shorter pins are each preliminarily ground to a conical point on one end and one or more of these pointed pins as needed is tapped into place between the other pins after the screws **D** have been moderately tightened, thus firmly locking the entire assembly with a minimum of effort.



Sketch of simple fixture for holding pins while the ends are surface ground

The V-blocks are made of such a height that the ends of the pins to be ground extend somewhat above them, as shown. After one end of each pin has been sufficiently ground on a surface grinder to produce a smooth surface, the entire assembly is reversed on the table of the grinder and the other ends of the pins are then ground until the pins are of the length desired.

Method for Removing Frozen Bushing from Blind Hole

By Frank M. Butrick, Jr.

AN effective method used by the writer for removing a frozen

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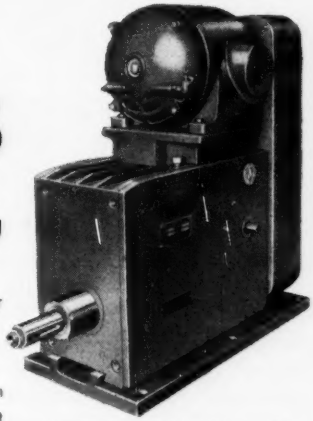
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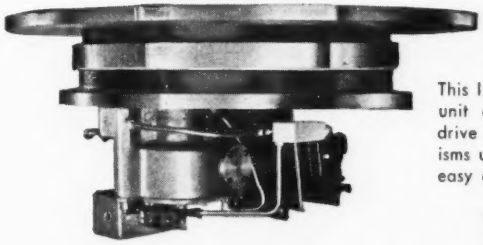
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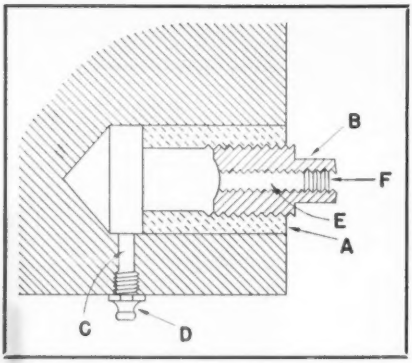


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Sketch showing effective method for removing frozen bushing from blind hole

bushing from a blind hole when other methods proved inadequate is illustrated in the accompanying sketch. The bushing, **A**, was first tapped to accommodate a pipe plug, **B**, which was threaded into the bushing as tight as possible. A hole, **C**, was then drilled in one side of the part in which the bushing was located until it broke through into the blind hole. The hole **C** was tapped to accommodate a fitting, **D**, for a grease gun. Next, a hole **E**, was drilled through the pipe plug and tapped for a ¼-inch socket head set screw, **F**, which was started in the hole about four turns, after which the bushing was filled with grease from the side hole **C** and the set screw turned further into the pipe plug.

Long before the set screw had been threaded the length of the hole **E**, the bushing started to work out of its hole. The set screw was then backed out of its hole a short distance, more grease applied, and the set screw tightened again. Soon the bushing could be pumped out of its hole by pressure from the grease gun.

ZEWO

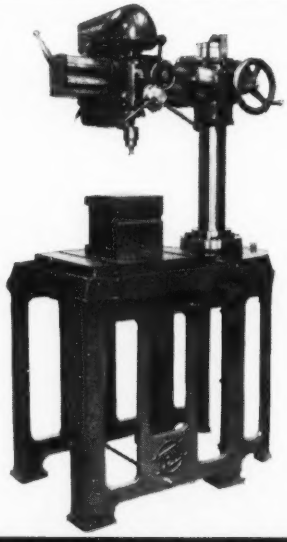
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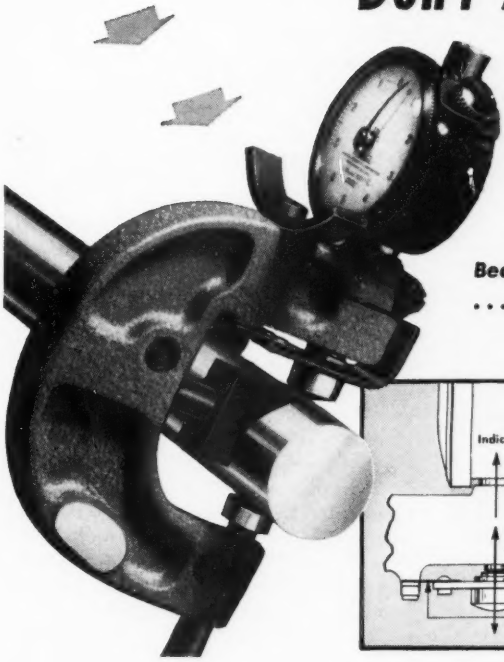
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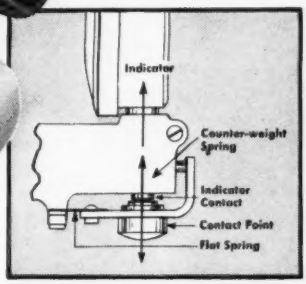
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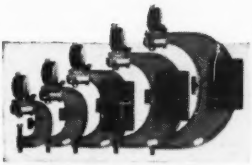
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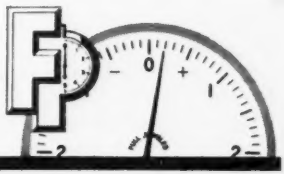
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Guest Editorial

By JOHN CHIPMAN
President, American Society for Metals
Professor in Charge Department of Metallurgy
Massachusetts Institute of Technology

Metallurgical Engineering — A most promising career

ENGINEERS, educators and industrial executives are all gravely concerned about the most serious shortage which now faces American industry. This is the shortage of technically trained manpower. It requires no crystal ball to foresee that the ultimate effect of such a shortage will be far more serious than that of nickel or columbium or any other metal on the critical list. Statistics on college enrollment in the field of engineering show very clearly that instead of an increasing supply of technical manpower, we must look forward during the next three years to a seriously declining number of engineering graduates.

WE recently listened to Dr. Chipman deliver an address pertaining to the urgent need for metallurgists. So impressed were we by his sincere efforts to give this problem more widespread attention that we invited him to tell his story in Modern Machine Shop. The accompanying editorial explains the problem and offers a solution.

Thousands of students will be graduating from high schools all over the nation this month and next. Perhaps you may be in a position to advise one of these graduates in the selection of a career. We hope that Dr. Chipman's remarks may help you to give sound advice.—Ed.

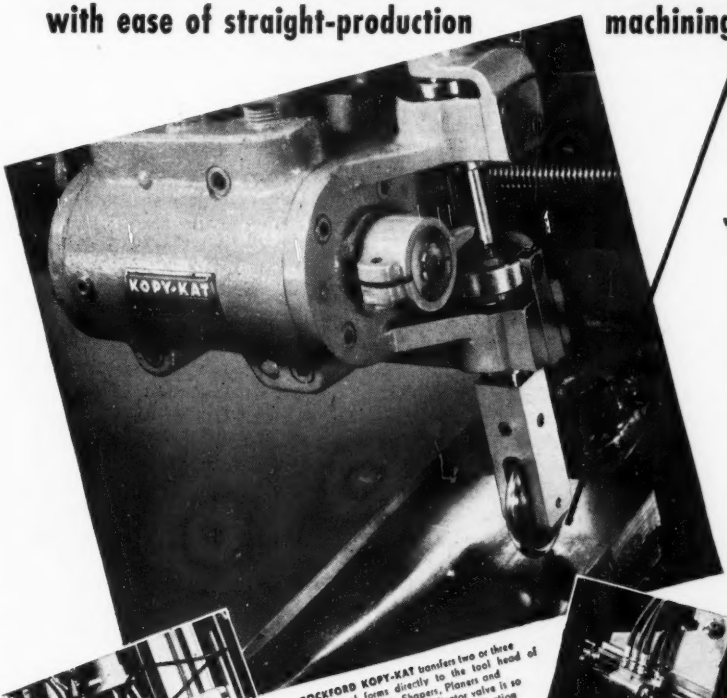
The seriousness of the situation may easily be seen from figures that have been collected by the Engineering Manpower Commission. Last year there was a total of 38,000 graduates from all the engineering schools in the United States. This was less than half of the number needed by industry at that time and half of them were recruited by the armed services. Compare this inadequate number with this year's graduating class of 26,000. No wonder each graduate in engineering has his choice of any number of jobs! This year's decline is scheduled to continue into the next two years with about 17,000 and 12,000 engineering graduates in 1953 and '54. In a highly competitive technologic age, do you agree that this situation is alarming?

This shortage of engineering students affects every engineering school and every branch of engineering. In a very special way it is affecting the number of graduates in the field of metallurgy. Here is a field of engineering which has never drawn large numbers of students because its nature and importance have not been adequately understood. The shrinkage in enrollment in metallurgy is perhaps no greater than that in other engineering fields but beginning with an enrollment which was already inadequate, the result inevitably means an extreme lack of metallurgy graduates.

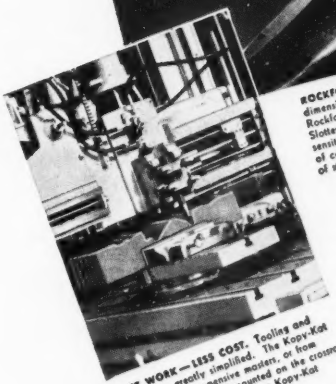
The study of metallurgy should appeal to any young man who is interested in

DUPLICATES FORMS DIRECTLY!

with ease of straight-production machining



ROCKFORD KOPY-KAT transfers two or three dimensional forms directly to the tool head of Rockford Hydraulic Shapers, Planers and Slotters. The hydraulic duplicator valve is so sensitive, so exact, that positive duplication of complex forms is done with the ease of straight-production machining.



FAST WORK—LESS COST. Tooling and fixtures are greatly simplified. The Kopy-Kat transfers from inexpensive masters, or from the original form itself mounted on the crossrail or table. This view shows the Kopy-Kat planing the two-dimensional cross section of a shear blade.



DIRECT TRANSFER—NO INTERMEDIATE MOTIONS. Inaccuracies are eliminated by the absence of intermediate motions. Here, a Rockford Kopy-Kat is shown reproducing a plow-share die . . . a good example of three dimensional reproduction.

● A Rockford Machine Tool Co. representative will show you how the Kopy-Kat can simplify your form-machining problems. Let him give you the complete story, with examples, on many varied and complex mathematical curves and shapes. For a quick picture send for Data Sheets 524.

Hy-Draulic

ROCKFORD MACHINE TOOL CO.

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science. Students of metallurgy are expected to study both chemistry and physics since both of these fundamental sciences form the bases for metallurgical science. But metallurgy is not purely science. It is also engineering and a metallurgist must be both a scientist and an engineer. Consequently, the student of metallurgy must have much of the same kind of training that other engineering students receive. The result of these requirements is that in most schools the curriculum in metallurgy is a broad and interesting one—interesting, that is, to the student with an engineering or scientific bent.

Graduates in metallurgy have found opportunity in all kinds of industry. The time has long since passed when a metallurgist was useful only to the mining and smelting industries. Nowadays metallurgists find employment, and quite remunerative employment, in the vast array of industries which use metals in manufacture. The aviation industry, for example, and the automotive industry with their great numbers of independent suppliers, employ a fairly large fraction of the metallurgical graduates and are anxious to obtain more. The steel industry and other metal industries such as aluminum and brass and magnesium require increasing numbers of metallurgists. The electrical and machinery industries are asking for more metallurgists than the schools can supply. My friends working in the field of atomic energy tell me that the really crucial problems that face them at the present moment are metallurgical problems. One cannot go far in the designing of any new device before he faces that age-old question, "What are you going to make it of?" It is in the answer to this question that the metallurgist becomes the key man in many new developments.

It is not every college that teaches metallurgy. As an engineering subject ("metallurgical engineering" means exactly the same thing) courses in metallurgy are found in the more progressive engineering schools. The American Society for Metals has taken an active interest in promoting metallurgical education and has prepared a pamphlet on "A Career in Metallurgy" that will be of interest to any high school student in selecting a career. It contains a list of schools offering courses in metallurgy and is available on request from the Society at 7301 Euclid Avenue, Cleveland 3, Ohio.

In summary, the nation needs engineers. The current shortage of engineering students constitutes a grave danger to the national security. Every technical man in the country should join in the effort to direct a greater number of qualified high school graduates into the study of science or engineering.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



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Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease—and it's non-inflammable. Write for FREE SAMPLE to test.

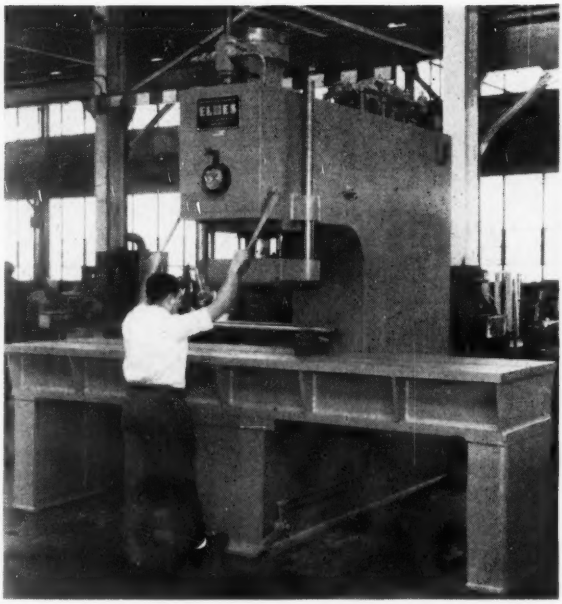
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VIEWS OF UNUSUAL MACHINES

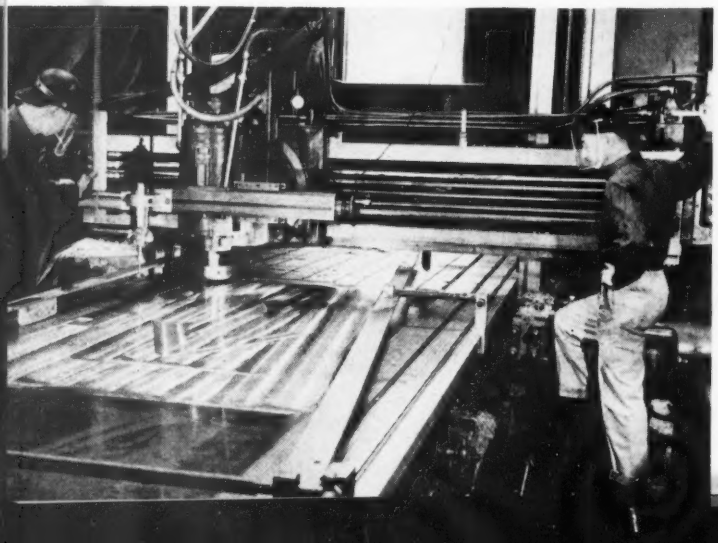
Dual-Purpose Hydraulic Press

THIS Elmes C-Frame Hydraulic Press, recently installed in a large ordnance plant, was designed and built by the Elmes Engineering Division of American Steel Foundries, Cincinnati 29, Ohio. The press has a capacity of 75 tons and is specially equipped for double-duty performance. This table is removable, making the press usable as a general-purpose straightening press, and, in addition, an opening in the bed allows for forcing operations.

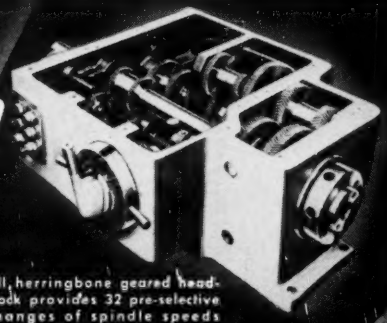


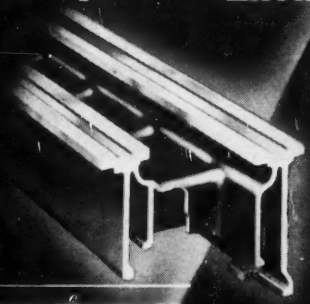
Skin Milling Aircraft Part

THE illustration herewith depicts the skin milling of an aircraft part on a planer equipped with an Onsrud high speed milling head, tracer-controlled by a Turchan Follower Atfachment, made by Turchan Follower Machine Co., Detroit 4, Mich. The template and tracer, which can be seen at the left, are used to guide the hydraulically-operated cutting tool in close tolerance over the work to effect unusual savings in time and cost. The size of work machined with this method is limited only by the capacity of the planer.



SIDNEY BONUS* DESIGNED LATHES



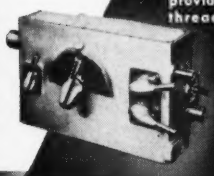


All herringbone geared headstock provides 32 pre-selective changes of spindle speeds through convenient dial control. Spindle and intermediate shafts are equipped with center bearings in addition to end bearings. Spindle mounting automatically compensates for expansion caused by temperature rise.

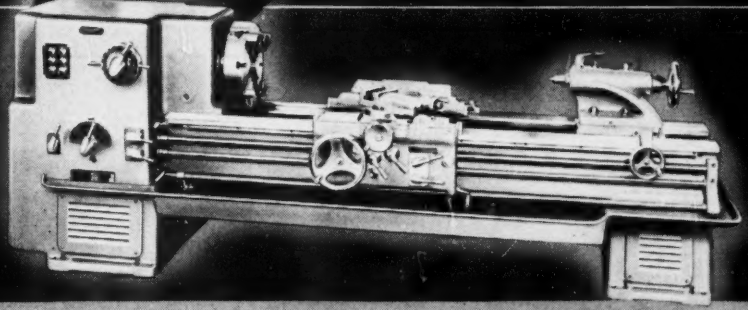
*BONUS...
"Something given in addition to what is usual or strictly due"
...Webster's Dictionary

Rigid four-wall bed construction with double cross girts spaced at 12" intervals. Casting is of semi-steel nickel mixture for close grain structure.

Sidney's totally enclosed dial controlled gear box provides 60 changes of threads and feeds. All moving parts run constantly in oil.



● More and more manufacturers are taking advantage of the many outstanding construction features of Sidney Lathes that give them precision work—greater production—lower costs. That's why we call it Bonus Designed.



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News

Southern Subcontractor Begins Machine Tool Deliveries

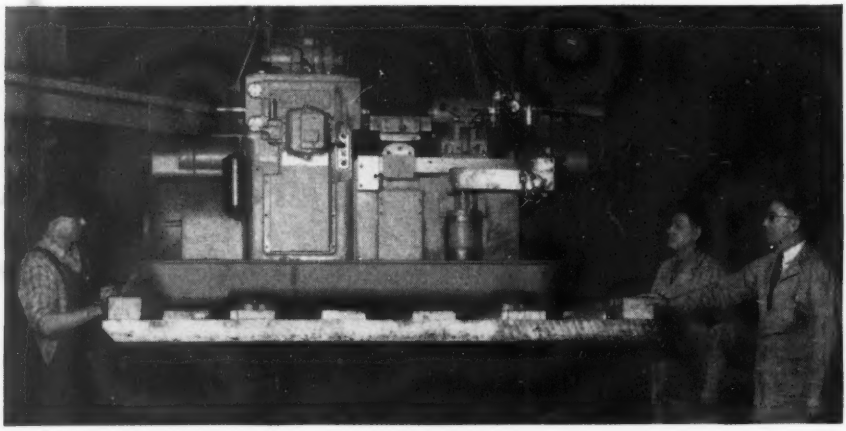
Shown herewith is the first of the No. 12 Hydraulic Automatic Lathes to be delivered to the Gisholt Machine Co., Madison, Wis., by its subcontractor, Continental Gin Co., Birmingham, Ala. The machines are built up complete with basic tooling and then shipped to Madison for final test. Shown inspecting the lathe are Alfred Dvorak, foreman of the test floor; Elmer Weidemann, assistant foreman; and Alfred Reynolds, assembly department.

Nice Ball Bearing Company Celebrates Golden Anniversary

The Nice Ball Bearing Co., Philadelphia, Pa., manufacturer of ball and roller bearings, is now celebrating the Golden Anniversary of its founding in 1902 by William Nice, Jr. Considerable progress has been made by the company during the first half century, and it is now recognized as one of the leading producers of ball and roller bearings.

During World War II, Nice contributed substantially to the war effort

This illustration shows the first No. 12 Hydraulic Automatic Lathe delivered to Gisholt Machine Company by its southern subcontractor, Continental Gin Company.



OF THE INDUSTRY

and received many awards, including the Army-Navy "E" with two stars. Increased demand for Nice products since the war has resulted in a program of almost continuous growth and expansion so that now well over a million bearings are produced each month and used in various products all over the world.

Carborundum Company Executive Aided in Study of Budget's Effect on Factory Personnel

Willis T. Windle, controller and treasurer of The Carborundum Co., Niagara Falls, N. Y., aided in the preparation of "The Impact of Budgets on People," a report recently completed by Controllership Foundation, Inc., New York, research arm of Controllers Institute, to which Mr. Windle belongs. The report, which tells how the conflicting reactions of budget personnel and factory supervisors can be ironed out and replaced by cooperation, is based on a study of actual conditions in four company's plants. The survey project was conducted for the Foundation by the School of Business and Public Administration of Cornell University.

Two basic ways to overcome the problem are prescribed in the report. One is to obtain true participation of the factory supervisors in the actual making up of the budget, and the other is to train the budget staff in human relations, to help them "sell" cost records and budgetary control.

Copies of "The Impact of Budgets on People" are available at the offices of the Foundation, 1 East 42nd St., New York 17, N. Y. They are priced at $1.50 to Controllers Institute members, $3.00 to all other persons.

Numatics Changes Ownership

The former partnership which owned and operated Numatics, Milford, Mich., manufacturer of operating valves for compressed air, has been dissolved by the death of one of the partners, Fred H. Russel. William Carls has purchased all the assets of the company, including those of R. D. McLeod, retired, and has assumed the sole ownership. He will continue to operate the company as heretofore with the same personnel.

The present staff of representatives throughout the country will be augmented by a number of new men to be appointed to serve additional territories.

Heyman Rosenberg

Heyman Rosenberg, founder, officer and director of the Parker-Kalon Corp., 200 Varick St., New York, N. Y., died recently at the age of 78 years. Mr. Rosenberg came to the United States in his early youth and entered the business of sheet metal fabrication, which led to his interest in fasteners for that field. With Louis Goldburg, he established the Parker-Kalon Corporation in 1914. He was the originator and patentee of self-tapping screws, which are now universally used in the assembly of automobiles, aircraft, ships, electrical appliances, and other metal and plastic products of every description.



Heyman Rosenberg

A prolific inventor, Mr. Rosenberg had been granted over 200 United States and foreign patents, most of which covered screws of various types and machinery for their production. He was the recipient of many engineering honors, including an award by the Franklin Institute of Philadelphia and a pioneer inventor's award by National Association of Manufacturers.

Durant Manufacturing Company Productimeter Plant Expanded

The Durant Manufacturing Company, manufacturer of Productimeter counting and measuring machines, has announced the enlargement of its three-story plant on North Buffum St., Milwaukee, Wis. A new addition

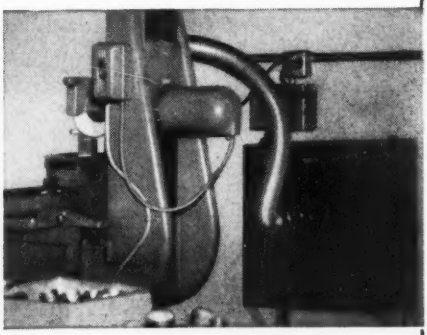
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MEDELTON

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"GRIP-FEED" POWEROLL

NEW



- **Positive Feeding!**
  Material is fed by means of hardened and ground pinch rollers — thus eliminating all slipping and binding.
- **Feeds Stock to 1/8" thick!**
  Since feeding is positive, thick stock as well as oily or kinked coils can be fed.
- **Variable Speed Drive!**
  Rate of uncoiling can be accurately synchronized with speed of press. Amount is controlled by sensitive micro switch.
- **Easy Loading!**
  No overhead crane necessary. Swing away the pinch rolls and roll it up the ramp.
- **Built-In Portability!**
  Heavy duty casters and jack handle built into machine. Move it anywhere.
- **Simple Positioning of Coil!**
  You can line up the coil in relation to die in matter of seconds by means of jack-like action of separator plates.
- **Heavy Duty Construction!**
  All rollers mounted on heavy duty ball bearings. ½ HP motor. 2¾" diameter pinch rollers.

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MACHINE TOOLS

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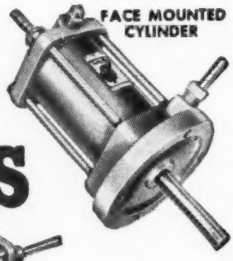
245 Connecticut Ave.,
Bridgeport, Conn.

completed in February of this year adds 16,000 square feet to provide space for new offices and plant production.

A pioneer in counter design and manufacture, this company had its beginning in 1879. The present factory site was purchased in 1918. Today, Productimeter counting and measuring machines comprise over 300 standard models for all types of industrial application, as well as special adaptations for the growing electronic field of manufacture.

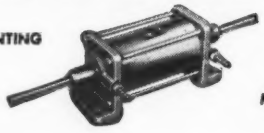
Expansion in sales engineering services accompanies the increased manufacturing facilities. Within the past few months new representatives have been appointed on the West Coast: James C. Hale Company, San Francisco; Paul J. Short at Portland, Oregon; A. W. Nash Company, Los Angeles. In the East, Bernard J. Glista covers the State of Connecticut. In the South, William E. Brice Company, Houston, covers Texas. The Chicago branch office sales personnel has been increased to two with the appointment of Edward C. Carlson as Chicago district manager. A new warehouse and repair department have been established in Greenville, South Carolina, under the management of H. V. Barker, to facilitate deliveries and services in the southern area. The eastern division at Providence, R. I., is under management of L. A. Nourie.

DOUBLE-ACTION
AIR CYLINDERS

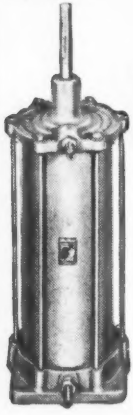


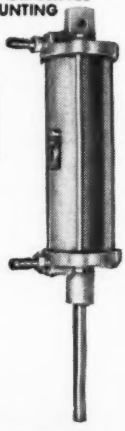
HORIZONTAL MOUNTING

VERTICAL MOUNTING



SUSPENDED OR SWIVEL MOUNTING

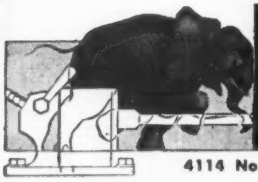




Mounting	Bore				
Horizontal	1½"	2¼"	3"	4"	5"
Vertical	1½"	2¼"	3"	4"	5"
Face	1½"	2¼"	3"	4"	5"
Swivel	1½"	2¼"	3"	4"	5"

Length of stroke optional

The new Mead Air Power Catalog shows the full line of single and double-acting cylinders, and air-operated Presses, Vises, Chucks, Hammers, Work Feeders—for faster, money-saving production. Write today!



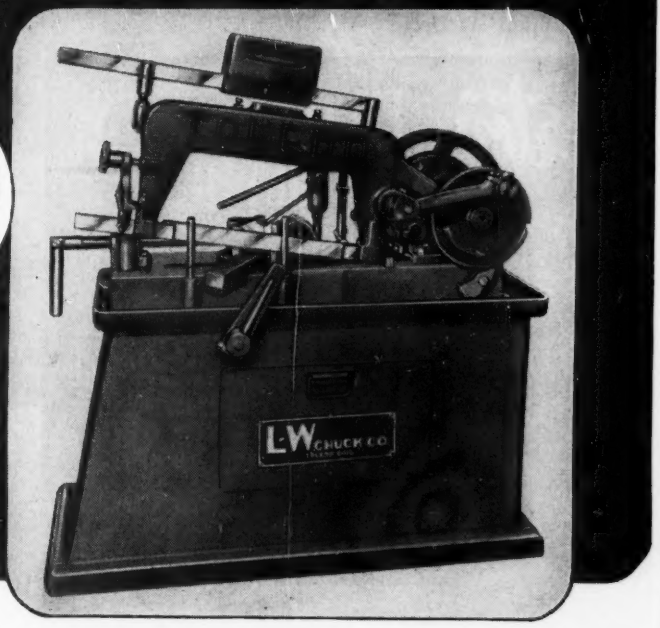
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LW POWER HACK SAWS

Everything You Want in a Good High Speed Saw at an Ever-So-Low Price!

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Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



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Van Norman Company Elects Officers

Charles R. Crowder, vice president and general manager of The Van Norman Co., Springfield, Mass., manufacturer of machine tools and automotive service equipment, was elected first vice president and a member of the board of directors at the annual meeting of stockholders. All other directors were re-elected. They are Henry A. Field, William A. Hebert, Donald P. Hess, James J. Minot, R. W. Porter, Roger L. Putnam, James Y. Scott, and F. D. Van Norman.

At the annual directors' meeting, T. W. Baush, general export manager for Van Norman and its subsidiary, Morse Twist Drill & Machine Co., New Bedford, Mass., and George H. Dickinson, sales manager for the Automotive Division, were elected vice presidents. Other present officers were re-elected. They are James Y. Scott, president; F. D. Van Norman, chairman of the board; and R. W. Porter, treasurer and clerk.

Mr. Crowder has been associated with Van Norman since 1929 when he became a member of the automotive sales staff. He became sales promotion manager in 1937; vice president in charge of the Automotive Division in 1945; and vice president and general manager of the company in 1951. Mr. Baush has been connected with Van Norman for 28 years, and Mr. Dickinson came to Van Norman 20 years ago as division manager, covering several midwestern states.





Wherever nuts, bolts or studs are to be applied, or removed, there's a reversible CP AIR IMPACT WRENCH that will do the work with maximum speed and ease — with no twisting thrust to fatigue the operator.

The complete CP line — eight wrenches ranging from ¼" to 1¾" bolt size — includes angle-head as well as straight models.

Powerful, compact, perfectly balanced — CP Impact Wrenches are available with side, pistol grip or straight handles, and trigger or lever-type throttles.

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ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

B. S. Meade Now Manufacturers' Agent

Barney S. Meade, formerly general sales manager of Michigan Abrasive Company, has gone into business as a manufacturers' agent, with headquarters at 604 Duquesne Terrace, Union, N. J. He has been named by Supreme Products, Inc., 2222 S. Calumet Ave., Chicago 16, Ill., to handle the firm's line of Supreme Brand chucks in New Jersey, eastern Pennsylvania, Delaware, Maryland, and the District of Columbia.



Barney S. Meade

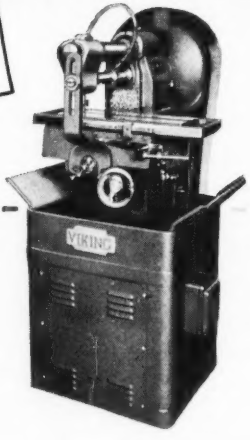
Mr. Meade has had wide experience in the fields of hardware, automotive products, and mill supplies. He has served as vice president and general manager of American Swiss File & Tool Co., Newark, N. J., and prior to that was field sales manager for Charles Parker Co., Meriden, Connecticut.

W. W. Sieg Recipient of David Ford McFarland Award

The Penn State Chapter of the American Society for Metals has announced selection of William Wetzel Sieg as 1952 recipient of the David Ford McFarland Award. President of Titan Metal Mfg. Co., Bellefonte, Pa., Mr. Sieg received the award at a dinner meeting April 25 at State College. The award was established in 1949 as an annual recognition to a metallurgy alumnus of the Pennsylvania State

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√ on SMALL PARTS
√ with CLOSE LIMITS
√ and FINE FINISH

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2" Precision Spindle • Variable Speeds • Wide Capacity • Oversize Design and Construction

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VIKING *Hydraulic* SPEED-MILL

Porter-Cable

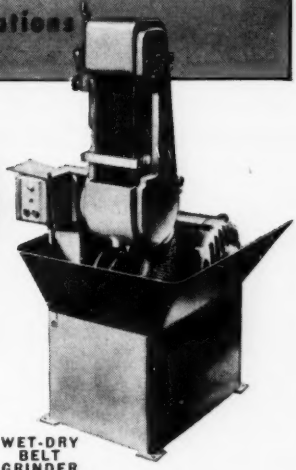
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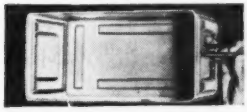


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Model 506
6" Belt; 12½" Platen

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Work-holding fixtures are often unnecessary. When required, they are relatively simple and inexpensive. 55% to 75% set-up and lock-up time is saved . . . often eliminated.



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Complete LINE:

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- Free-Belt Grinders
- Contour Grinders
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City ..... State .....

In Canada write: Strongridge, Ltd., London, Ont.

College. Mr. Sieg's selection was based upon his attainments in a metallurgical industry and outstanding work in civic affairs.

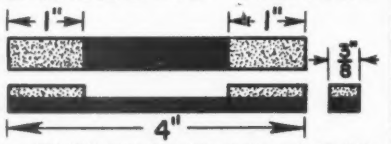
Prior to his present company connection, Mr. Sieg was employed by the Ingersoll Rand Co., Philipsburg, N. J., and the Revere Brass & Copper Co., Rome, N. Y., as a metallurgist. In 1929 he joined the Titan Metal Manufacturing Company and was appointed to the board of directors in 1934. He became vice president and general manager in 1936 and president in 1948. He is a member of the board of directors of Consolidated Coppermines Corporation, the Bellefonte Trust Company, and Copper & Brass Research Association.

• • • • CARROLL • • • •
DIVIDING HEADS



3 SIZES — 4 MODELS — 6" to 12"
CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave., Cincinnati 9, Ohio

DIAMOND HONES



• DOUBLE END 200-400 GRIT • FREE CUTTING RESINOID BOND • LIVE AREAS, EACH 3/8 x 1 x 3/32 • OVERALL 3/8 x 7/32 x 4 • DIAMOND ALL THE WAY THROUGH • PERFECT FOR TOUCHING UP CARBIDE TOOLS.

$16.50 EA. NET FROM STOCK
Use Dry or With Kerosene or Cutting Oil
TOOLS WHEELS POWDER HONES
Please Write for New Catalogue

DTR
305 East 45th Street
New York 17, N. Y.
Tel: MUrray Hill 4-0466-7-8

Diamond Tool Research Co., Inc.
FOREMOST IN DIAMOND TECHNOLOGY

Barber-Colman Purchases Wheelco Instruments Company

The Barber-Colman Co., Rockford, Ill., has purchased the principal assets of Wheelco Instruments Co., Chicago. Wheelco products consist of indicating, recording, and controlling industrial instruments and combustion safeguards. Present plans are to continue current operations in Chicago until such time as manufacturing facilities can be gradually transferred to Rockford in a manner that will result in very little interruption in shipments. No changes are contemplated in Wheelco's national sales and service organization.

Barber-Colman Company entered the automatic control field in 1926 and is now recognized as one of the leaders in the industry.

KELLY Fast Grip Toggle
CLAMPS

The balanced design feature of Kelly Fast Grip Toggle Clamps—assures: Positive holding, fast action, quick one hand release. No-Mar Clamp illustrated used for clamping on smooth & polished surfaces. Will not scratch or mar.



Clamp Model NO-MAR

Write for Literature.
R. J. KELLY MFG. CO.
P. O. Box 61 (Broadway Sta.), Newport, R. I.

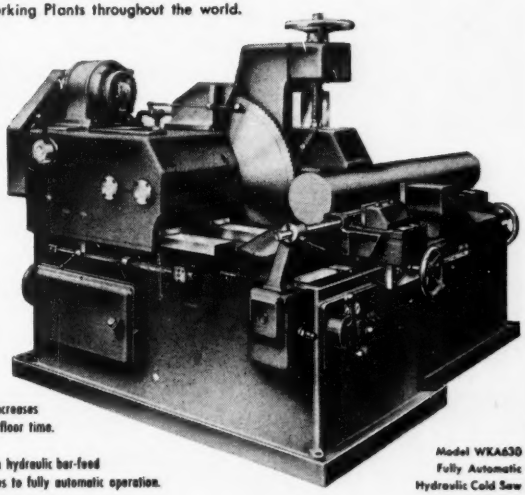
Wagner Hydraulic COLD SAWS

for Semi-Automatic Fully Automatic CUTTING

The dependability and efficiency of Wagner Cold Saws have been proven by the thousands of machines installed in Metal Working Plants throughout the world.

Features for Dependable Performance

- **TWO POINT DRIVE**—The double worm gear transmits power through helical gears to two points on the saw arbor. This two point contact withstands the heaviest stresses of constant operation.
- **HYDRAULIC FEEDS**—All operations are hydraulically controlled. The infinitely variable feed protects the saw blade against overload—even with the heaviest cuts. The pressure adapts itself automatically to the varying thickness of the cross section and hardness of the work piece.
- **SEMI-AUTOMATIC OPERATION**—After the work is in position, only the movement of a single lever controls the cycle of operation—clamping—feeding—rapid return motion—release. This feature increases safety, makes machine fool-proof and reduces floor to floor time.
- **FULLY AUTOMATIC OPERATION**—Incorporating a hydraulic bar-feed into the hydraulic system easily converts these machines to fully automatic operation.



Model WKA630
Fully Automatic
Hydraulic Cold Saw

Wagner Cold Saws for Your Cutting Operations

		WK500	WK630	WK800	WK1000	WK1250
SEMI-AUTOMATIC						
Maximum Cuts	● Rounds	8"	10½"	13½"	16½"	21¼"
	I Beams	16" x 6"	20" x 6½"	24" x 7½"	24" x 7½"	24" x 7½"
FULLY AUTOMATIC		WKA500	WKA630	WKA800		
Maximum Cuts	● Rounds	7"	8½"	11½"		
	I Beams	15" x 6"	19" x 6½"	23" x 7½"		

All machines can be equipped with Mitre Vises for cutting mitres up to 45°

Write for Bulletin 39b fully describing these Cold Saws

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools—from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

J. F. Ferdinand Elected Sales Vice President of Wales-Strippit

The election of Jerome F. Ferdinand as vice president in charge of sales has been announced by George F. Wales, chairman of the board of directors of the Wales-Strippit Corp., North Tonawanda, N. Y., manufacturer of machine tools and metal fabricating machinery. Mr. Ferdinand, veteran of World War II, joined Wales-Strippit in 1943 as a tool designer in the engineering department. In 1946, he was promoted to the position of works manager in charge of all production. In 1949, after a tenure as sales representative in western New York and Pennsylvania, Mr. Ferdinand was appointed sales manager of the Wales organization.



Jerome F. Ferdinand

George H. Nye

George H. Nye, president of the Circular Tool Co., Providence, R. I., died recently of a heart attack at the age of 57. In 1923, Mr. Nye and the late W. B. Hopkins, an inventor and machinist, founded the Circular Tool Company to specialize in the manufacture of circular metal cutting saws, with Mr. Hopkins as president and Mr. Nye as sales manager. Started on a small scale, the business expanded and moved to more ample quarters which have been extensively enlarged and modernized in recent months. After Mr. Hopkins' death in 1938, Mr. Nye became president. L. J. Hopkins, treasurer, is still active in the business.

BIG JUMP FORWARD
in Boring and Facing!

Six Sizes Available



Our Model "D"



All Models Have POWER FEED for Facing

• A Boring Head that Won't Face is Not Complete

RE-DESIGNED Many New Features

Write Today for Complete Details

CHANDLER TOOL COMPANY, MUNCIE, INDIANA

COMBINED BORING & FACING TOOL HEADS

Chandler-Duplex

EXAMINE *It Closely*

THERE IS A DIFFERENCE



Model J, 10" x 18" capacity. Available as a wet or dry cutting machine.

JOHNSON METAL CUT-OFF BAND-SAWS

Have Outstanding Features

If you are thinking about new metal-cutting equipment, it will pay you to investigate the outstanding features of the Johnson Metal-Cutting Saws. Their exclusive design, ample capacity and ruggedness speak for themselves. These efficient low-cost machines offer the highest value available today.

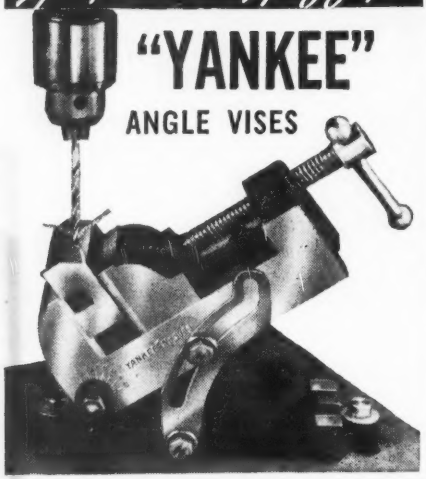
Write for Details Today

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

Jig in a Jiffy

"YANKEE"

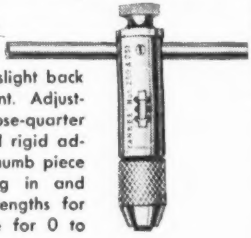
ANGLE VISES



Shortcut costs on small jobs with this fast-acting, economical jig. Lock the work in the "Yankee" Angle Vise. Tilt for the angle and lock. You're set up for every operation . . . hand or machine. Also available with quick-release swivel base. Two jaw widths . . . 2" and 2¾". Each vise supplied with grooved "V" Block for holding rounds.

"Yankee" Ratchet Tap Wrenches

for tight spots



Ratchet needs only slight back and forth movement. Adjustable cross-bar for close-quarter work. R.H., L.H. and rigid adjustments. Knurled thumb piece for speedy starting in and backing out. Two lengths for 0 to 5/16" taps, one for 0 to 3/16" taps.

WRITE FOR "YANKEE" TOOL BOOK

NORTH BROS. MFG. CO.

Philadelphia 33, Pa.

YANKEE TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

R. L. Schmitt Moves to New Plant

The R. L. Schmitt Company, manufacturer of carbide tools, has announced its removal from Wyandotte to a new larger plant at 6536 Roosevelt, Allen Park, Mich. Mr. Schmitt, the owner who organized the company two years ago, has been associated with the carbide tool business since its inception.

The Schmitt Company specializes in the manufacture of solid carbide tools, end mills, center laps, grinding tools, reamers, midget burrs, and rotary files—standards and specials.

George McGregor Morris

On March 26, George McGregor Morris, chairman of the board of Morris Machine Tool Co., Cincinnati, Ohio, died at the age of 82. Although he retired in 1935, Mr. Morris still retained an active interest in business, civic, and fraternal affairs on local and national levels. During his active business life, he was president of both the Morris Machine Tool Company and The John B. Morris Foundry, the latter firm now out of business. His father, John B. Morris, founded both firms.

Mr. Morris is survived by two daughters and a son, John B. Morris, who is president of the Cincinnati firm, a well-known manufacturer of radial drills and high production drilling, tapping, and reaming machinery.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Buckeye

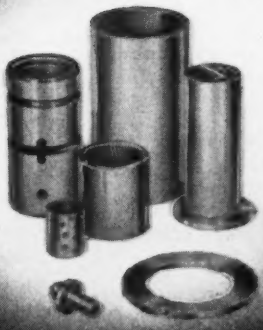
BRONZESMITHS SINCE 1900

Rx FOR CUTTING COSTS

"The Lowest Cost Bronze Bearings Are Those That Can GO THE DISTANCE!"

For Stock Bearings and Maintenance Bars SEE YOUR NEAREST BUCKEYE DISTRIBUTOR!





FOR SPECIALS

For Bearings to your specifications, write direct to The Buckeye Brass and Manufacturing Company, 6410 Hawthorne Avenue, Cleveland 3, Ohio

BARS • BEARINGS • BUSHINGS

Metal-Working News in Brief

Edwin M. Miller has been appointed plant superintendent of the Machine Division for The Lincoln Electric Co., Cleveland 17, Ohio. Mr. Miller has been with Lincoln for 29 years, having started with Lincoln following his graduation from high school. His appointment follows the resignation of **H. F. Kneen,** manufacturing vice president of Lincoln.

Arthur H. Nelson has been appointed manager of electric tool sales in the Chicago branch of Independent Pneumatic Tool Co., Aurora, Ill., manufacturer of Thor portable power tools. Mr. Nelson has been a Thor service engineer for the past several years.

— o —

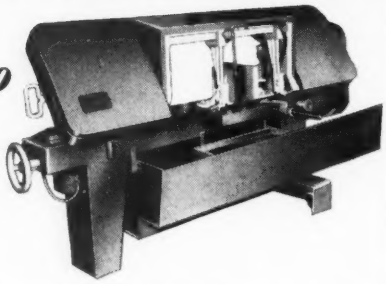
Leo P. Sinclair, formerly head engineer, Aviation Ordnance Branch of the Material Division, Navy Department, has been appointed field engineer for Daco Machine & Tool Co., 202 Tillary St., Brooklyn, N. Y., manufacturer of precision instruments for aircraft and ordnance industries and specialist in complete instrument tooling programs. Mr. Sinclair will function as laison officer on several government projects.

— o —

Otto Svoboda has been appointed sales manager of E. W. Buschman Co., Cincinnati, Ohio, manufacturer of conveyors and material handling equipment. Mr. Svoboda was associated with Robbins and Myers Company before joining Buschman.

GET ACCURACY that SAVES STOCK...

...get *Kalamazoo* METAL CUTTING BAND SAWS



Here's *real* precision metal sawing that cuts waste to a minimum, saves hard-to-get stock. *Kalamazoo* Band Saws cut bars, rounds, flats, angles, odd shapes to within a few thousandths of size. What's more, there's an absolute minimum of kerf and *no* burr.

You can get Kalamazoo Metal Cutting Band Saws in three sizes ... for cutting 6" to 12" rounds. 6" x 10" to 12" x 20" flats. Each model can be had with coolant system for continuous cutting. Each is available with casters for complete portability. Write for details on the many exclusive *Kalamazoo* features that spell *better cutting at lowest cost to you.*

MACHINE TOOL DIVISION

***Kalamazoo* TANK and SILO CO.**

510 HARRISON ST., KALAMAZOO, MICHIGAN

New Flexible Sealing...

T-J AIR CYLINDER

Designed with revolutionary application of

Super-Cushion



It's *sealed with pressure*—a revolutionary T-J application of flexible sealing that insures positive cushion action combined with automatic valving action for fast return stroke . . . eliminates binding and sticking . . . operates with *low friction, minimum wear,* and *added power* due to higher efficiency.

More PLUS features! New type packing nut incorporates a piloted diameter, assuring perfect alignment. Improved rod packing increases sealing efficiency. Piston rod and internal cylinder tube surfaces are hard chrome plated—a standard practice with T-J for over 15 years.

Write for bulletin 252 . . . The Tomkins-Johnson Co., Jaskson, Mich.

1. Metallic rod scraper to protect rod bearing and packing from dirt and grit.
2. Wrench flats.
3. Self-adjusting chevron type packing.
4. Permanent type adaptor ring.
5. Hi-tensile tie rods.
6. Heavy duty, hard chrome plated rod.
7. Generous fillet reduces stress concentration.
8. "O" ring static seal.
9. T-J new flexible cushion seal insures positive cushion with automatic valve action for fast return stroke. (Patent applied for)
10. Fine cushion adjustment.
11. Heavy wall precision honed hard chrome plate.
12. Controlled packing compression with metal to metal contact.

36 YEARS' EXPERIENCE (T-J)

TOMKINS-JOHNSON

VALVES · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHERS

Metal-Working News in Brief

Garvin A. Drew has been appointed assistant vice president of the Scovill Mfg. Co., Inc., Brooklyn 17, N. Y. with respect to the affairs of the Schrader Division. He will continue in his capacity as general sales manager. Mr. Drew also serves as a member of the Schrader Division executive committee and the board of managers.

Austin Industrial Corporation is now occupying new and larger quarters at 75 Mamaroneck Ave., White Plains, New York.

— o —

Peterson Steels, Inc., has moved from Newark, N. J., to its new headquarters and warehouse in Union, N. J. The company will continue to maintain its present branch offices in Chicago, Illinois, and Detroit, Michigan.

— o —

Alexander Sellers, Jr., former Buffalo, New York district manager for the Warner & Swasey Company, has been named sales development manager for the Machine Tool Division of the Van Norman Co., Springfield, Massachusetts.

— o —

Lincoln Park Industries, Inc., has announced that **Henry C. Wulff** has been appointed plant superintendent of its Lincoln Park Division, Lincoln Park, Mich. Mr. Wulff has been associated with the company for the past 12 years and, more recently, held the position of assistant works manager.



production flows smoothly...

at top speed, at all times, yet free of rejects

Kester makes 62 different fluxes to meet any requirements. Why not write our Technical Department for full information?

KESTER SOLDERING FLUX

KESTER SOLDER COMPANY
4275 Wrightwood Ave., Chicago 39
Newark 5, N. J. • Brantford, Canada

KESTER SOLDER

EXCEL No. 6 PAYS BOTH WAYS

TOOL & CUTTER GRINDING HEADQUARTERS in the smaller shop—

EXTRA SHARPENING SERVICE in the larger plant—



An outstanding value in price and performance! The Excel No. 6 Universal Cutter and Tool Grinder will accurately sharpen reamers and milling cutters in a wide variety of shapes and sizes. A full line of attachments is available for a multitude of applications including cylindrical and internal grinding. Base optional.

Builders of Precision Grinders for 78 Years

Swings work	8" dia. x 16" long
Face mill capacity	12" dia.
Table surface	4" x 24"

PROMPT DELIVERY FOR DEFENSE

COVEL PRECISION GRINDERS

BENTON HARBOR — MICHIGAN

DRILL GRINDERS
CUTTER & TOOL GRINDERS
HYDRAULIC & HAND FEED SURFACE GRINDERS

Write for **BULLETIN MM-52**

Metal-Working News in Brief

The appointment of **Vincent L. Bradford,** vice president in charge of sales, to the post of director of advertising has been announced by James A. Sharkey, executive vice president of the Milford Rivet & Machine Co., Milford, Conn., manufacturer of split and tubular rivets, cold-headed specialties, and rivet-setting machines.

F & D Machine & Tool Works, Three Rivers, Mich., manufacturer of cutting tools and grinding attachments, has purchased the Reamer Division of N. J. Daniels Tool Co., Haverhill, Massachusetts.

— o —

Morehead Patterson, chairman of the board and president of American Machine & Foundry Co., New York 17, N. Y., has been re-elected a board member of the National Industrial Conference Board, a non-profit institution designed to gather, test, explain, and distribute facts essential to the establishing of management, labor, governmental, and economic policies that accelerate industrial progress and promote the general prosperity of the American people.

— o —

Michael E. Errico has been appointed sales manager for the Laminated Shim Co., Glenbrook, Conn., manufacturer of shim stock and stampings. He will contact plants and distributors in New England.

Severance DEBURRING CUTTERS HIGH SPEED CARBIDE

Unexcelled for power and hand deburring
Sectional pattern teeth give shearing action

Severance INSIDE DEBURRING CUTTERS
GROUND-from-the-solid

Select 45° High Speed cutters from 28 standard sizes and 30° cutters from 35 sizes—from ¼" to 3" diameters.
45° 30°
Both angles can be supplied in CARBIDE

Severance OUTSIDE DEBURRING CUTTERS
GROUND-from-the-solid

For speedy light deburring of rod ends and tubing O. D's., either off-hand or in screw machines. Select 30° cutters from 14 standard sizes and 45° cutters from 10 sizes—up to 4 inch diameter.
ANGLES 30° & 45° C/L
Both angles can be supplied in CARBIDE

OUTSIDE CHAMFERING MILLS
Operate in machines to perform heavy chamfering without chatter —in above size range and angles.

HEADQUARTERS FOR DEBURRING AND CHAMFERING TOOLS DEVOID OF CHATTER

Severance HAND DEBURRING CUTTERS
"A Twist of the wrist" easily bites off the bur left by drill or punch.
Ten standard sizes for ¼ to 2" diameters.
Write for Bulletin 16-D

Complete REGRINDING Service — by New Tool Craftsmen — Savings are thus multiplied —

SEVERANCE TOOL INDUSTRIES, INC.
724 IOWA STREET • SAGINAW, MICH.
In Canada: 60 Front St., W., Toronto

MIDGET MILL GROUP
MIDGET MILLS
¼" Shanks
JUNIOR MILLS
LAB MILLS

TUBING GROUP
STANDARD Chamfering
SOLID (For Radius Lip)

COUNTERSINK GROUP
STANDARD
HEAVY DUTY
BALL SEAT REAMER



THIS NEW BULLETIN WILL HELP YOU PICK THE RIGHT HEATING METHOD

The heating method you use for a specific silver alloy brazing job, is a main factor in determining joint quality and brazing time, labor and cost. The bulletin outlines the different heating methods and the type of brazing jobs for which each is best suited. It will aid you in making the right choice. WRITE today for a free copy. Ask for BRAZING NEWS No. 56.

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N.Y.

DEALERS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CAL.
TORONTO, CANADA

Metal-Working News in Brief

Raymond J. Zale has been appointed sales metallurgist for the Firth Sterling Steel & Carbide Corp., Pittsburgh 30, Pa. He was formerly employed by Lindberg Steel Treating Company as plant metallurgist and assistant plant manager of the company's Rochester Division. Following this he was New York State sales representative for Darwin & Milner, Incorporated.

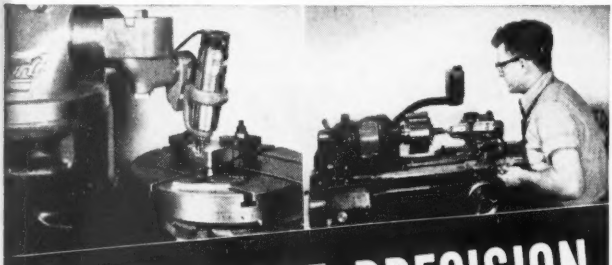
The Cleco Division of Reed Roller Bit Co., Houston, Texas, manufacturer of air tools and accessories, has announced the appointment of the following companies as distributors for Cleco products in their areas: **Briston Metal Working Equipment Co.,** 534 Front St., Hartford, Conn.; **S & M Supply Co.,** 761 S. Seventh St., Grand Junction, Colo.; and **Quinn Welding Supply Center,** 2725 Chicago Rd., Chicago Heights, Illinois.

—o—

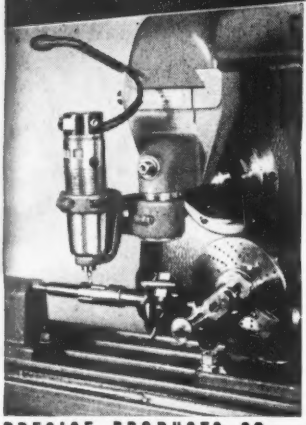
Nichols-Morris Corp., formerly located at 50 Church St., New York 7, N. Y., is now occupying new and larger offices at 75 Mamaroneck Ave., White Plains, New York.

—o—

Carl G. Levin, M. W. Isaacson, and **C. Chandler Cole** have been elected vice president and secretary, vice president and sales manager, and vice president and comptroller, respectively, of the Powdered Metal Products Corporation of America, Franklin Park, Ill. All three men were associated with the company before their election.



LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



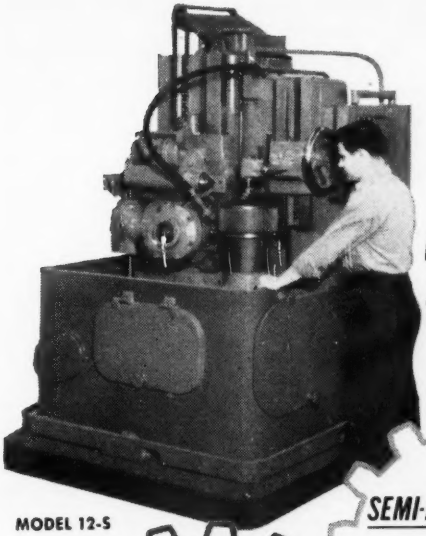
ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¼ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

Write FOR CATALOG

PRECISE PRODUCTS CO., 1345 Clark St., Racine, Wis.

PRECISE GRINDER-MILLERS



MODEL 12-S

Automatic HOBBING does the JOB

FASTER, BETTER, MORE ACCURATELY

THE *SEMI-AUTOMATIC* LEES-BRADNER GEAR HOBBING MACHINE

FEATURES AND SPECIFICATIONS

L-B patented Hob in-out mechanism
L-B electric hob shifter now available on the LEES-BRADNER Model 12-S

Rated capacity in steel . . . . . 4 DP

Maximum diameter capacity,
a) With 4″ hob . . . . . 12″
b) With 3″ hob . . . . . 13″
Travel . . . . . 16″
(Max. face width)

● The pioneers of gear hobbing machines in this country have done it again!

Now Lees-Bradner brings you the ingenious Model 12-S *automatic* gear hobbing machine with the electric hob shifter.

This amazing machine produces gears of maximum accuracy—including right or left hand spur and helical gears up to 45°.

After loading, it is necessary only to press the starter button and the hob is fed automatically across the face of the work at constant speed. At the completion of the cut the machine stops for reloading. Hence, one unskilled operator can easily handle a battery of these machines.

If production time and accuracy are at a premium in your plant it will pay you dividends to talk to your Lees-Bradner representative—*soon!*

the LEES-BRADNER *Company*

CLEVELAND 11, OHIO, U.S.A.

Metal-Working News in Brief

C. W. Martin has been appointed die sales and service engineer for Carboloy Department of General Electric Company in the company's Pittsburgh office at 704 Second Avenue. Mr. Martin, who has almost 20 years experience in the steel and wire drawing field, has recently been on the die training staff of the Carboloy Customer Training School in Detroit.

Gerry Attridge, assistant general manager of Lovejoy Tool Co., Inc., Springfield, Vt., has been elected a director of the company, succeeding **George Perry,** who has retired.

— o —

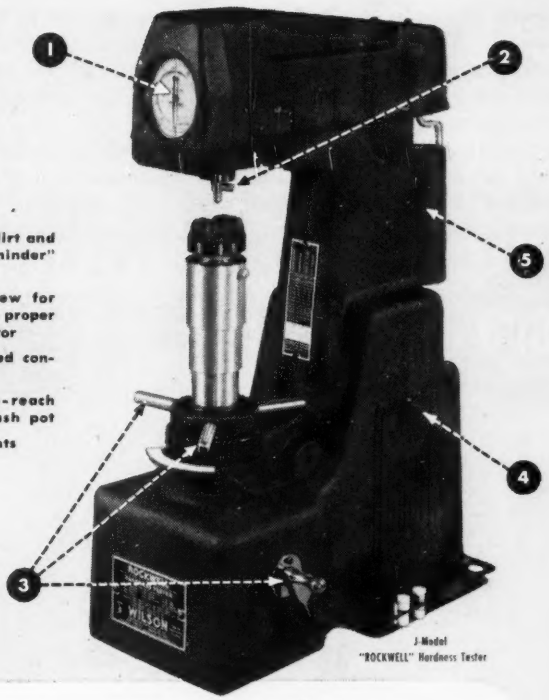
E. W. Bliss Co., Canton, Ohio, has announced the establishment of district representation in New York City and surrounding areas with the opening of its new branch office at 50 Church Street. An inventory of finished replacement parts for Bliss presses will be maintained in the Metropolitan area. **L. R. Hills,** who has many years of experience in sales engineering and design engineering work with Bliss, has been appointed district sales manager for the New York area.

— o —

Verson Allsteel Press Co., Chicago 19, Ill., has announced the appointment of **Harry Ankeney** as works manager of its Chicago plant. Mr. Ankeney has been associated with Verson since 1946, originally as electrical engineer and as plant engineer prior to his most recent appointment.



an **ACCO** product



J-Model
"ROCKWELL" Hardness Tester

1. Totally enclosed, dirt and dust-proof "Zerominder" dial gauge
2. Gripsel clamp screw for quick change and proper seating of penetrator
3. All controls grouped conveniently
4. Enclosed, easy-to-reach variable speed dash pot
5. Standardized weights

5 Important "ROCKWELL"* Features

You can be *sure* of the hardness of incoming metals and the various parts or products you ship to your customers if you use a WILSON "ROCKWELL" Hardness Tester. Only in the WILSON will you find these five important features which assure accuracy and ease of operation.

There are two types of WILSON "ROCKWELL" Hardness Testers . . . Regular and Superficial. They come in many styles with accessories for testing flats, rods, rounds, and odd shapes. For micro-indentation hardness testing, there is the WILSON TUKON.

*Trade Mark Registered

WILSON "ROCKWELL" and TUKON Hardness Testers

ACCO

TRADE MARK

Write for information and let us make recommendations

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.

Metal-Working News in Brief

Niagara Machine & Tool Works, Buffalo 11, N. Y., manufacturer of presses, shears, and other sheet metal working machines and tools, has announced the opening of a Philadelphia district sales office in suburban Philadelphia at 50 E. Wynnewood Rd., Wynnewood, Pa. **Joseph J. Ortalli** has been appointed district manager.

J. M. Robert, president of Grobet File Company of America, Inc., New York 13, N. Y., has announced the promotion of **Neill S. Graham** to vice president, in which capacity he will continue in charge of the company's Chicago branch at 311 North Displaines. **Charles Lender** has been appointed vice president in charge of sales and will be located at 421 Canal St., New York.

—o—

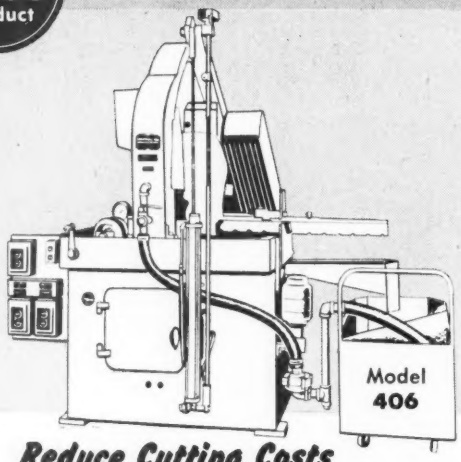
Earl W. Haugh, sales manager of Kaufman Mfg. Co., Manitowoc, Wis., has announced the appointment of **Four States Machinery Company** as representative of Kaufman products. Headquarters for Four States are located at 5304 W. Chicago Ave., Chicago, Ill., and 606 W. Wisconsin Ave., Milwaukee, Wisconsin.

—o—

Jack B. Grieser has joined the sales staff of the Metal Spraying Corp., Milwaukee 15, Wis. Mr. Grieser has a sales background in metallizing equipment as well as metallizing shop experience.

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Metal-Working News in Brief

Carl Hirschmann Co., Manhasset, N. Y., Los Angeles, Calif., and Milwaukee, Wis., has been appointed exclusive U. S. representative for the line of turning and thread chasing machines, second-operation machines, hardness testers, and measuring machines manufactured by Ebosa, S. A., Grenchen, Switzerland.

—o—

Kennametal Inc., Latrobe, Pa., has announced the appointment of **S. Allen Oviatt** as manager of sales engineering, Kentanium products, with headquarters at the home office. His duties will be to promote the application of Kentanium—the company's heat-resistant material—particularly among manufacturers of aircraft engines.

—o—

The appointment of **John E. Newlin, Jr.,** as sales manager of the steel division has been announced by Henry Disston & Sons, Inc., Philadelphia, Pa., manufacturer of saws, tools, and special alloy steels. He succeeds **H. D. Siegfried,** who retired after 27 years with Disston.

The appointment of three general managers to head tap divisions of Minnesota Mining & Mfg. Co., St. Paul 6, Minn., has been announced by Louis F. Weyand, executive vice president in charge of tape.**C. C. Smith,** former general sales manager of the tape division, will head the cellophane tape division. **William E. Zimmerman** has been made general manager of the industrial tapes division, and **Bernard W. Lueck** has been named general manager of the masking tapes division.

—o—

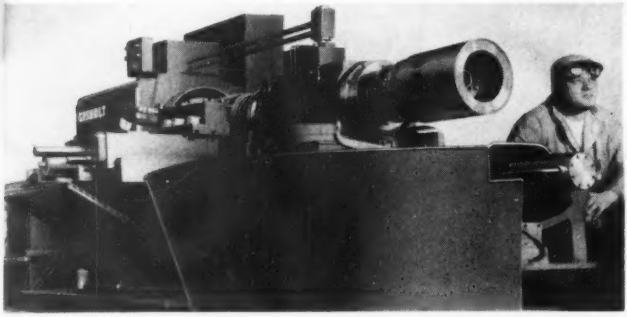
William C. Schneider has been appointed sales representative by Selas Corporation of America, Philadelphia, Pa., heat processing engineers. Mr. Schneider's headquarters will be at 315 Brooklawn Dr., Rochester 18, N. Y., and his territory will include central and western New York State.

—o—

J. S. Roscoe and **G. E. Tenney** have been elected directors of The Lincoln Electric Co., Cleveland, Ohio. Mr. Roscoe, who is director of purchasing for the company, joined Lincoln in 1924. Mr. Tenney, service manager, joined Lincoln in 1932.

Secret Weapon?

THE unit shown in the accompanying illustration is not a new secret weapon but is actually an unusual angle view of a Gisholt No. 24 Hydraulic Automatic Lathe built by the Gisholt Machine Co., Madison 10, Wis., for machining Diesel cylinder liners. The "gun" is nothing more than a cylinder liner on the swivel-base arbor of the machine. While one liner is being machined, the finished piece is unloaded and replaced with a new liner.

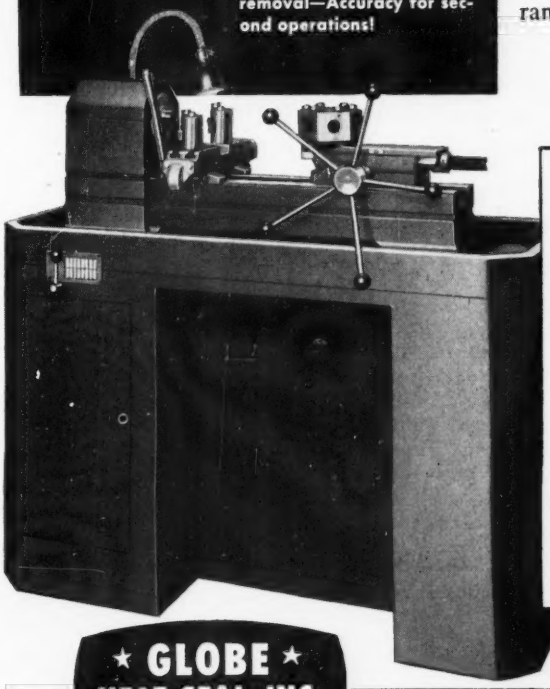


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PEDESTAL: Houses complete drive unit. Provisions for coolant pump and reservoir and collet storage.

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Book reviews

Modern Arc Welding. Published by Hobart Trade School, Hobart Square, Troy, Ohio. 544 pages. Illustrated. Price, $3.00.

A comprehensive and practical textbook on the procedure and practice of arc welding, this volume is of particular value not only to the student but also to the practicing engineer, welding operator, and designer. Clearly written, the 28 chapters are divided in five parts.

Part 1 discusses the development of electric arc welding, describes applications, available metals and alloys, joints and welds, electrodes, equipment, and other basic procedures. Part 2 constitutes a complete self-study course, incorporating review summaries, practical exercises, and "Quiz" questions. Part 3 describes in detail the principles and practical operations of carbon arc welding. Part 4 covers other welding processes such as inert-gas-shielded arc welding, submerged arc welding, and electric stud welddures a listing of welding terms and their defiinitions as compiled and authorized by the American Welding Society. The book is illustrated with over 300 photographs of operations, diagrams, and charts.



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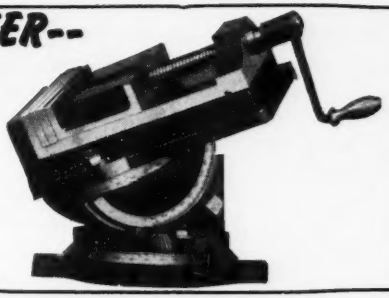
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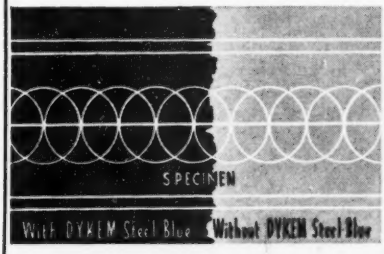
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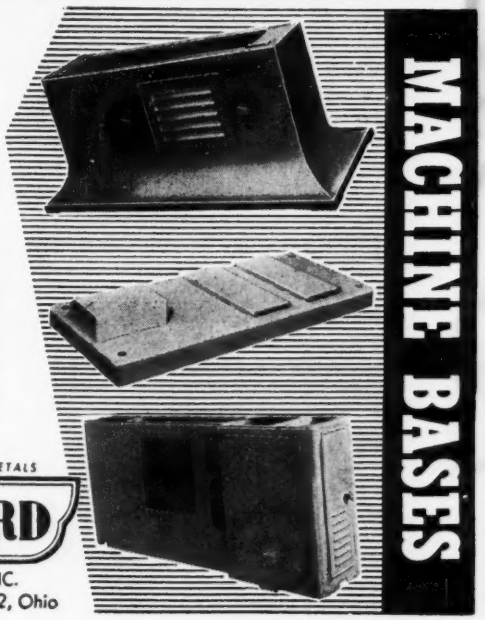
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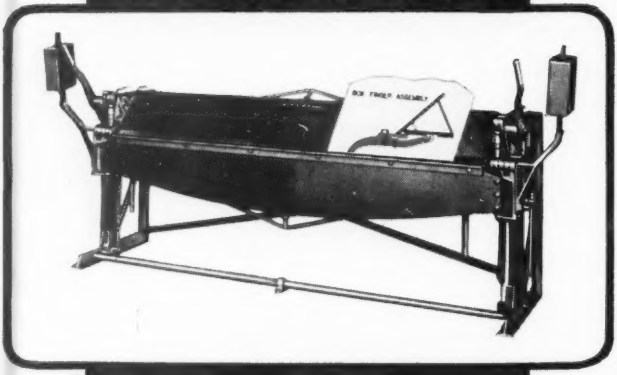
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433 E. Pearl St., Cincinnati 2, Ohio

Electrolytic Manganese and Its Alloys. By Reginald S. Dean. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 257 pages, 6 x 9 inches. 122 illustrations. 81 tables. Cloth binding. Price, $12.00.

Of interest to mining, metallurgical, and chemical engineers, to makers, fabricators, and users of light metal alloys, to electroplaters, and to power engineers, this volume is a record of the progress of electrolytic manganese production and the development of its uses since 1936, when a practical method for producing electrolytic manganese was first developed under the author's direction at the U. S. Bureau of Mines. The discussion is devoted to the production of electrolytic manganese, to the properties and uses of alloys in which manganese is necessary, and to alloys in which electrolytic manganese produces significantly different properties from the use of other types of manganese. Much of the material is drawn from published reports of the Bureau of Mines, to which has been added a substantial amount of hitherto unpublished material from the author's own laboratory work and work done in the field.

The contents are divided into three chapters headed as follows: Production and Properties of Electrolytic Manganese; Non-ferrous Alloys of Electrolytic Manganese; and Ferrous Alloys of Electrolytic Manganese.

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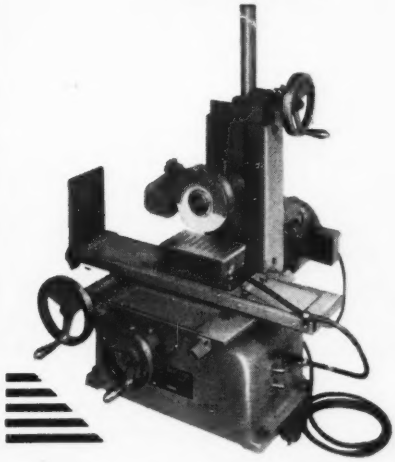
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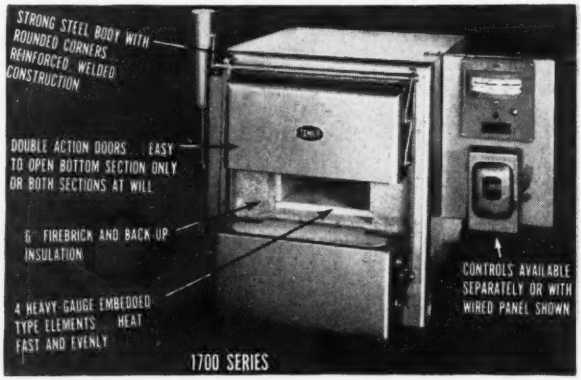
The Welding of Non-Ferrous Metals. By E. G. West. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. 553 pages. Illustrated. Cloth binding, board covers. Price, $8.50.

This book has been written with two main classes of reader in view: the welding engineer, welding operator, welding instructor and trainee on the one hand and the designer, works engineer, and metallurgist on the other. No attempt is made to describe in detail all the various welding processes. In order to assist the reader new to welding, brief descriptions of the processes and equipment are included in sufficient detail for the non-welder to understand the influence of the properties of the material on the modifications of the process found necessary. For those who wish to delve deeper into the many facets of the subject of non-ferrous metal welding, references to original papers are included throughout the book.

The contents of the book are divided into 14 chapters which are headed as follows: Weldability; Properties Important in Welding; Summary of Fusion Welding Processes; Resistance Welding Processes; Pressure Welding; The Welding of Aluminum and Its Alloys; The Welding of Magnesium Alloys; The Welding of Copper and Its Alloys; The Welding of Nickel and Its Alloys; The Welding of Lead and Its Alloys; The Welding of Zinc and Its Alloys; The Welding of Low Melting Point Metals; The Welding of High Melting Point Metals; and The Welding of Precious Metals.

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Proceedings of the National Electronics Conference (1951), Volume 7. Published by National Electronics Conference, 852 E. 83rd St., Chicago 19, Ill. 736 pages, 9¼ x 6¼ inches. Charts, diagrams, and tables. Cloth binding, board covers. Price, $5.00.

This book contains the papers — or digests thereof—presented at the 1951 conference. The 79 papers cover electronic research, development and application in audio systems, components, computers, high frequency measurement, information theory, magnetic amplifiers, medical and industrial applications, micro-wave and propagation, servo theory, signal detection, television and tubes. Volumes 2, 4, 5, and 6 may also be obtained for $5.00 per copy.

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Sheet Metal Work. By Robert E. Smith. Published by McKnight, & McKnight, Market & Center Streets, Bloomington, Ill., 76 pages, 7¾ x 10¼ inches. Illustrated. Price, $1.00.

This book contains information on the various kinds of sheet metal and the adaptability of each to industrial needs. It also presents definite instruction on how to fabricate these metals into their many everyday uses. The instruction is thoroughly supplemented by many excellent pictures and drawings.

Forging and Forming Metals. By S. E. Rusinoff. Published by American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. 279 pages. Illustrated. Cloth binding, board covers. Price, $3.95.

Impact forging, press forging, upset forging, extrusion, heat treatment of forgings, cleaning and finishing of forgings, inspection of forgings, safety in the forge shop, designing a forged part, designing dies and tools, metal quality, and selection of a metal for forging are all thoroughly described in this book. Each subject is covered as a separate unit, thus providing a flexibility which will permit selection or integration of the contents of the book to meet specification needs and individual requirements. Explanations are supplemented throughout the book with carefully selected photographs and an abundance of specially prepared drawings. In many cases, the entire sequence is illustrated from the first operation on metal stock to finished forging.

A Glossary of Forging Terms and a chapter entitled "Standard Practices and Tolerances for Impression Die Forgings" are included. The usages and specifications set forth in these sections are in accordance with those which have been adopted by the Drop Forging Association. An Appendix of Useful Tables and a selective Bibliography are provided at the end of the text.

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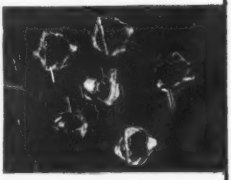
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BICKNELL-THOMAS COMPANY
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North American Combustion Handbook. Published by The North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio. 322 pages. Cloth binding, board covers. Illustrated. Price, $2.00 plus postage.

The purpose of this book is to provide users of combustion equipment with a basic explanation of the theory of combustion; outlines for combustion, heat transfer, and fluid flow calculations; charts and data to simplify and speed these calculations; and a discussion of combustion equipment, its selection and operation. The first chapter of the book is intentionally very elementary, being designed specifically for the newcomer to the field of combustion engineering.

Although the stated scope of the book is industrial heating with gaseous and liquid fuels, it also contains considerable information applicable to commercial heating and to solid fuels. The contents are divided into eight chapters headed as follows: The Elements of Combustion; Fuels; Combustion Analysis; Heat Transfer; Flow of Fluids; Burner Equipment; Combustion Control; and Combustion Systems. Also included is a glossary of terms used in the combustion industry and over 3,000 entries in the index of the book, which contains no advertising and is intended as both a text and reference work.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Optical Gaging Film

A 16 mm. sound motion picture which demonstrates and explains the principles of optical gaging and shows how optical gaging is being used in modern mass production and inspection has been completed by the Eastman Kodak Company. The film, "Optical Gaging," is available on loan to industrial, educational, and professional groups through Engineer Specialties, 890 Ellicott St., Buffalo, New York.

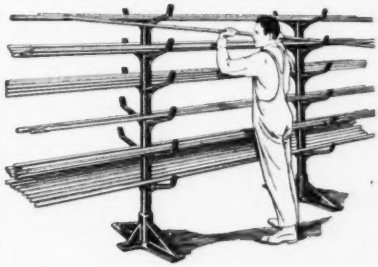
The film, which has a running time of 22 minutes, is designed to promote a broader understanding of optical gaging and to explain the principles on which it operates. The basic principles of optical gaging are discussed and demonstrated with various staging fixtures. The procedure used in designing fixtures is shown, and a comparison is presented that shows the results obtained when one part is inspected by both mechanical and optical gaging.



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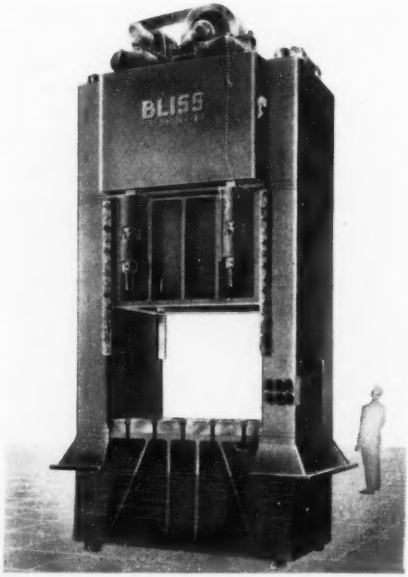
Four-Point Double-Action Toggle Press Provides for High Production

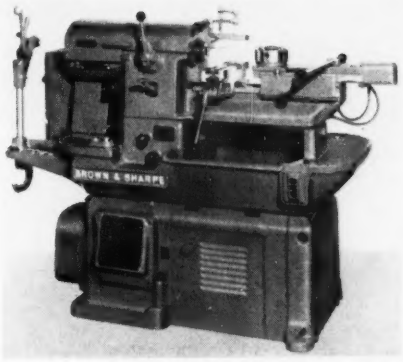
A four-point double-action toggle drawing press featuring quick advance and return speeds and extreme accessibility for maintenance purposes has been developed by E. W. Bliss Co., Canton, Ohio. The press is specially designed to meet the needs of the automotive and allied industries by making possible high production rates for large-area drawn stampings.

According to the manufacturer, maximum production rates are made possible through use of the Eddy Current Clutch which provides for quick approach to the work, slow-down to afford proper drawing speeds, and quick return speed to the top of stroke. Even with comparatively slow drawing speeds, a rapid press cycle is possible. The slow-down is accomplished by controlled slippage of the Eddy Current Drive Clutch through limit switches which can be adjusted to vary the speed of any portion of the draw cycle.

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Brown & Sharpe Hand Screw Machine

four totally-enclosed gears with integral eccentrics for operating the plunger slide. Crown sections beneath the gears form a rigid tie member for the front, center and back transvertical sections. All gearing and toggle bearings inside the crown are lubricated by a cascade oil system.

Each main rockershaft is in one piece and can be easily removed from the top of the crown by unshrinking the rockershaft bearing cap tie-rods with Calrod units. The intermediate rockershafts are also removable from the top of the crown. Provision has been made for pneumatic die cushions in the bed, or the bed can be fitted with a synchronized third motion if required. The press is built in a complete line of sizes and widths.

Hand Screw Machine Is Available in 3/8, 5/8, and 1-Inch Capacities

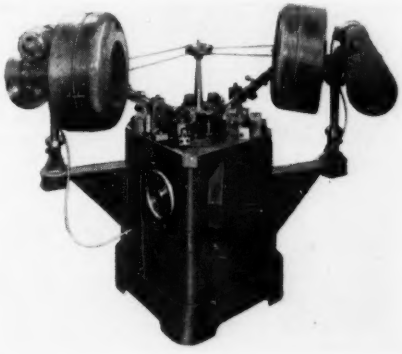
Brown & Sharpe Mfg. Co., Providence 1, R. I., has announced a hand screw machine featuring a full anti-friction bearing spindle having positive chain drive at all speeds and a completely enclosed drive similar to Brown & Sharpe automatics. One hundred ninety-six two-speed combinations are provided with ratios of high to low speeds from 1.6:1 to 13:1. Speed changes are made by means of simple pick-off gears.

The quick-operating one lever spindle control and mushroom-top trip lever for automatic chucks and bar feed are to similar design ot those on the corresponding wire feed machines, and the cross slide and turret are said to have the same convenient features. Automatic oiling is provided for all major mechanisms and bearing surfaces throughout the machine. Feed tubes, feeding fingers, collets, and many tools from Brown & Sharpe automatics can be used in the hand screw machine, thereby reducing toolroom inventory.

The machine is available in three models designated as the No. 00, No. 0, and No. 2. The No. 00 is designed to accommodate stock up to 3/8 inch in diameter (where work permits, to 1/2-inch diameter) and is said to turn any length up to 2 1/4 inches. The machine has a 3 h.p. rating and provides a spindle speed range from 6,050 to 50 r.p.m. The No. 0 is designed to accommodate stock up to 5/8 inch in diameter (where work permits, to 3/4-inch diameter) and is said to turn any length up to 4 inches. This model has a 3 h.p. rating and a spindle speed range of from 4,230 to 35 r.p.m. The No. 2 is designed to accommodate stock up to 1 inch in diameter (where work permits, to 1 1/4-inch diameter) and is said to turn any length up to 6 inches. The machine nas a 5 h.p. rating and a spindle speed range of from 3,025 to 25 revolutions per minute.

Machine Rolls Threads Quickly and Economically

Operating on the "planetary" principle, the Prutton "Rollmaster" now being manufactured by D. H. Prutton Machinery Co., 5295 W. 130th St., Cleveland, Ohio, is said to include many unique engineering features for high speed rolling in a wide variety of metals



Prutton "Rollmaster"

ranging from non-ferrous metals to hardened and stainless steels. According to the manufacturer, the machine is capable of producing Class 3 fit threads at 18,000 to 20,000 pieces per hour, including set-up time, and is designed to provide for the threading of up to 5,000,000 pieces from a single set of dies.

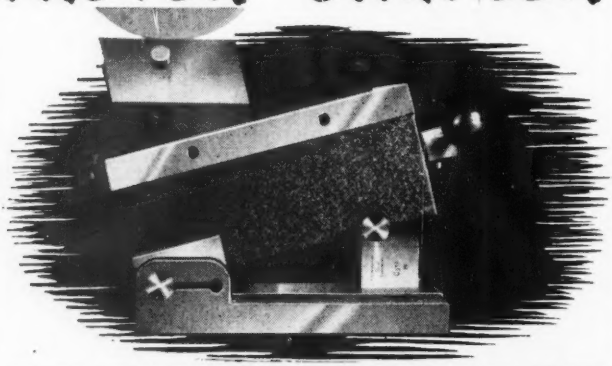
The Prutton Rollmaster can be used to thread bolts, fetter ring and spiral nails and is said to perform many knurling, marking, serrating, necking, and contour operations. The machine is available in several models for accommodating a wide range of work diameters.

Gouging and Chamfering Electrode Has Unique Properties

Known as the "ChamferTrode," a specially formulated electrode designed for gouging, chamfering, cleaning, and partial milling operations on any metal or alloy has been announced by Eutectic Welding Alloys Corp., Dept P, 172nd St. at Northern Blvd., Flushing 58, N. Y. Claimed to speed up the fabrication of armor plate and similar difficult-to-cut alloys, the electrode features a heavy coating which forms a cone at the striking end if the electrode, providing a natural jet effect arc. Thus, an intense, concentrated source of heat is created which, it is claimed, readily removes unwanted metal of all types so that the metal itself remains relatively cool. The surface of the gouged or chamfered material that has been acted upon by the Chamfer-Trode is said to be free from oxidation and slag, thereby providing a clean surface for later brazing or welding operations which may be desired. The chamfering blast is so concentrated that warping on thin material is negligible, and in all cases, the physical properties of the base material are claimed to be unaffected.

In addition, the heavy coating of the electrode is said to be specially designed so that arc establishment is momentarily delayed, thus enabling the operator to preplace the electrode exactly at the precise point at which he wishes metal to be removed before lowering his shield

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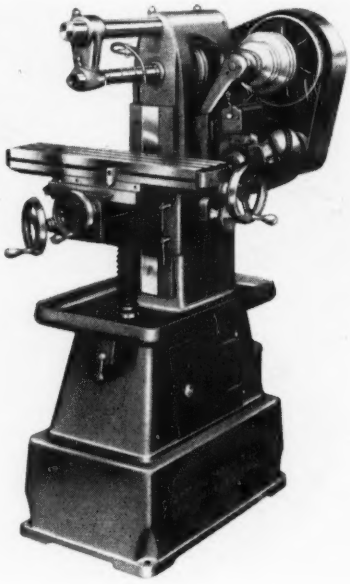
208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

or protective glasses to proceed with the work. Regular d. c. welding machines are used as the power source.

Milling Machine Has 14-Inch Longitudinal Travel

Product of Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif., the Diamond 22M Milling Machine illustrated herewith is said to feature unusual rigidity, precision, and capacity. The machine has a longitudinal travel of 14 inches; maximum vertical travel from center of spindle to table top of 15 inches; and cross traverse of 5½ inches. The full table working surface measures 5¾ x 24 inches.



Diamond 22M Milling Machine

The machine is equipped with offset handles which are said to make for ideal operation with a vertical head. Spring-loaded dials aid in making quick settings. The machine includes an automatic kick-off on the power feed and a motor drive design arrangement for standard N. E. M. A. type motors. A full line of accessories and attachments is available for the machine.

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Double Spindle Grinder for Finishing Thin Flat Parts

Gardner Machine Co., 428 Gardner St., Beloit, Wis., has developed a double spindle surface grinder for precision grinding both sides of thin flat parts in one operation. Designated as the No. 211, the machine includes a vertical column mounted on a sub base and provided with ball bearing ways on which the two grinding heads and head slides move with ease. The heads have a tilting feature, allowing the 23-inch diameter abrasive discs to be set to the proper angle for best grinding results. Head movement is controlled by handwheels located on the side of the column. A similar handwheel actuates the dresser.

Gardner No. 211 23-Inch Double Spindle Grinder

The power-driven rotary work carrier is located on the front of the sub base. Guides are provided to properly locate the workpieces while entering between the abrasives and to keep them properly located when leaving. Parts are hand loaded into the rotating carrier and unloaded automatically by gravity.

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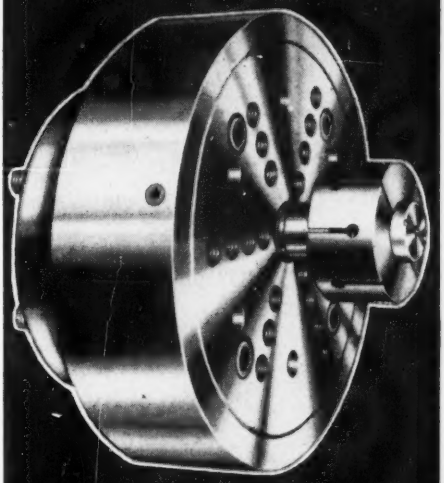
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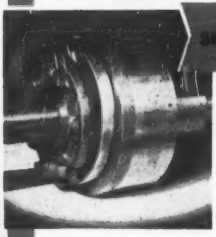
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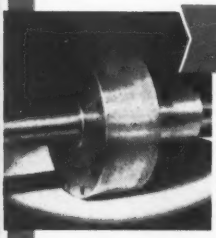
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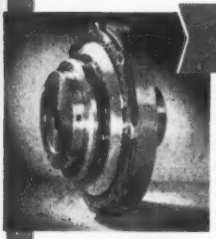
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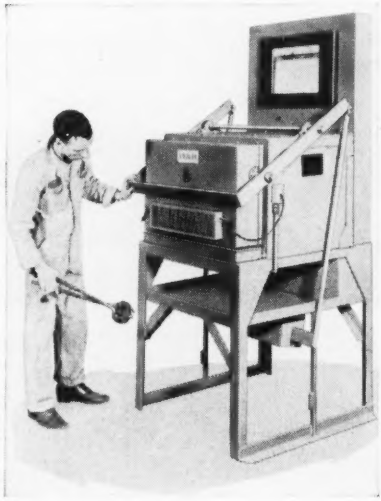
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Electric Box Furnace Has 15 x 12 x 30-Inch Chamber

Cooley Electric Mfg. Corp., Dept. F-2, 915 Daly St., Indianapolis 2, Ind., has announced an electric box furnace, designated as the Type BL, which has a chamber size of 15 x 12 x 30 inches, thus allowing for the handling of large units of work. The furnace employs an embedded type of heating unit which is said to protect the heavy element wire from atmospheric attack. The elements, formed in ceramic slabs, are located in each side, the bottom, top, rear wall,

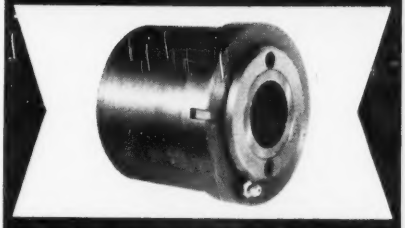


Cooley Type BL Electric Box Furnace

and door of the furnace to provide for maximum and uniform heat distribution. In addition, advantage is taken of the slab shape of elements to cause them to act as baffle walls. Unrestricted air spaces completely surround the elements and a natural air convection is thus created, further equalizing the temperatures. The elements, being in slab form, are each removable as a unit through the door opening in a matter of minutes.

The door comprises virtually the entire front wall of the furnace and is moved vertically in response to a simple easily-operated counterbalanced operating mechanism. Its effect is to seal the front end of the furnace from the high heat losses usually present at this point and to produce a quick heating furnace with rapid temperature recovery after

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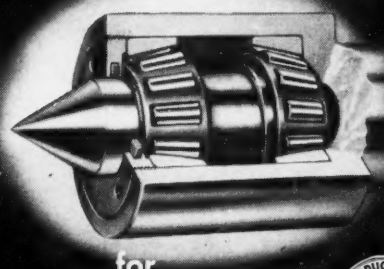
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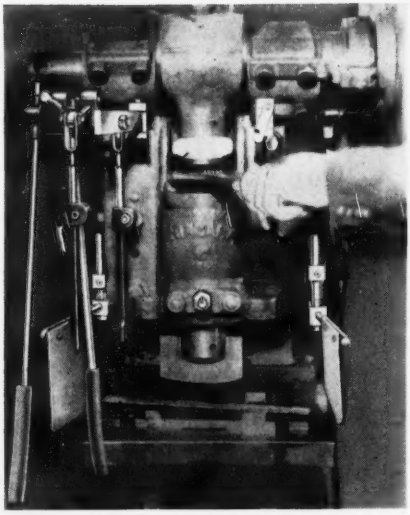
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exposing the furnace chamber for handling the work. The furnace is available in various sizes designed for operating temperatures up to 2,000 deg. F.

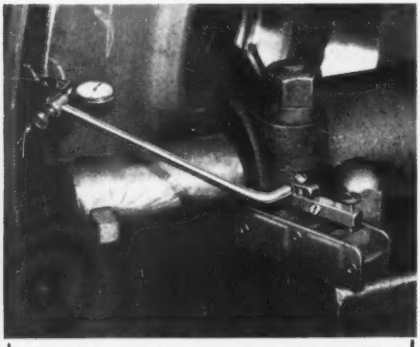
Double-Arm Guard Sweeps Hands Clear of Press Working Area

A double-arm sweep-type guard which is said to be particularly well adapted to short-stroke long-die power presses is now being manufactured by Searjeant Metal Products, Inc., Box 87, Mendon, N. Y. When the ram is in the "up" position, both guard arms are suspended in front of the center of the bolster plate, one arm in front of the other. As the ram descends, the two arms swing right and left respectively from their central position. The entire working area of the press is thus swept clear before the downward stroke has progressed far enough to close on fingers or hands.



Searjeant Double-Arm Sweep-Type Guard

The Searjeant Double-Arm Sweep-Type Guard is mounted on a hinged bar so that it can be easily swung to one side when the die setter is changing dies and making press adjustments. As an added feature, the guard can be equipped with a reset counter which records each downward stroke of the ram. A non-repeat device can also be installed with the guard if desired, as well as end-zone guards.



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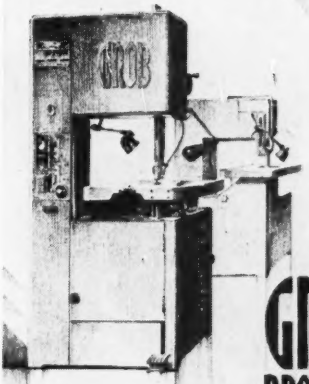
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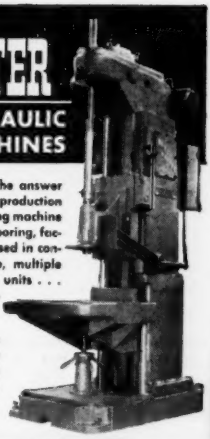
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DRILLMASTER vertical hydraulic drilling machines are available in five models, 5 h.p., 7½ h.p., 10 h.p., 25 h.p., and 50 h.p.

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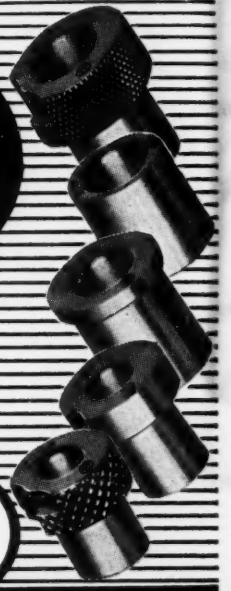
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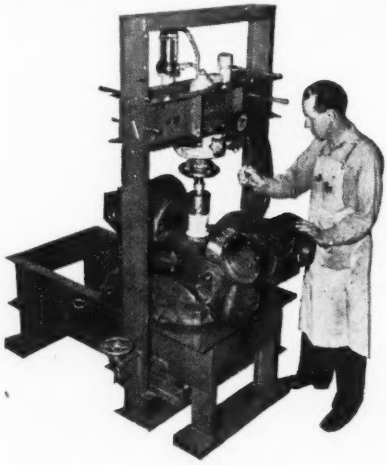
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THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

Movable Frame Press Is Designed for Handling Large Awkward Parts

Dake Engine Co., 612 Seventh St., Grand Haven, Mich., is now manufacturing a hydraulic press with movable frame for pressing, bending, or straightening large awkward parts. The press is provided with a large area table on which the work can be lowered by hoist or crane. The frame is then moved over the table. The workhead can be moved from side to side along the frame channel making it easy to center the workhead above the work laterally as well as longitudinally. Provision is made for moving the workhead up or down to adjust to the height of the work. The Dake Movable Frame Press is available in standard capacities of 25, 50, 75, and 125 tons and can be furnished for either electric or air-powered hydraulic operations.

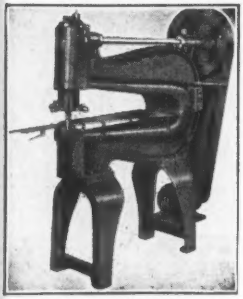


Dake Movable Frame Press

Machine for Opposed Sequence Operations

A machine for performing opposed drilling and counterboring operations in sequence has been announced by Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. The setup illustrated incorporates two Govro-Nelson Model HH Units wired to operate automatically in sequence. The

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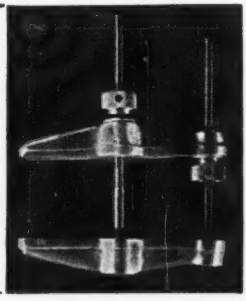
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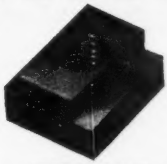
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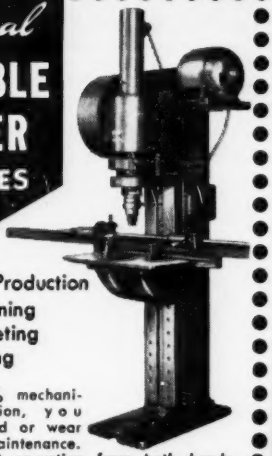
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BLOOMFIELD TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.

General

FLEXIBLE POWER PRESSES



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Foolproof Production

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Simple 100% mechanical construction, you can't overload or wear out. Low maintenance. Easy one-foot operation frees both hands. Many models and attachments save time and cost of special tooling. Profitable production rate within a few hours. Write for catalog.

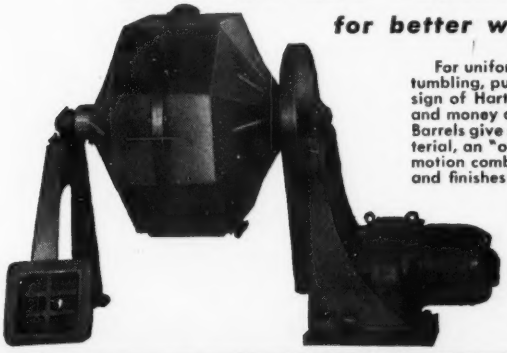
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CUTTING *and* TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

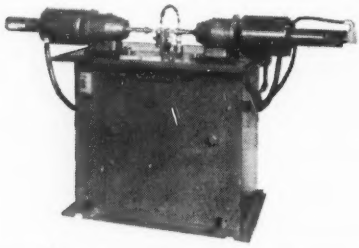
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W. S. TURNER	VICTOR R. CLARK	GUARANTEE TRUST BLDG.	E. O. MALTBY CO.	A. A. RODRIGUEZ, INC.
445 NEW CENTER BLDG.	605 W. WASHINGTON BLVD.	972 BROAD ST.	1718 SOUTH FLOWER ST.	55 W. 42ND ST. NEW YORK

2HS52

operator loads a small steel part in the fixture and touches the start button, whereupon one unit drills a No. 44 hole and a No. 30 counterbore with a combination tool. When this operation is completed, the second unit comes in from



Govro-Nelson Machine for opposed sequence drilling and counterboring operations

the opposite side and reams part way a No. 38 hole 0.004 inch off the center line of the first drilling and counterboring operation.

By varying the position of the units and the tools employed, the machine can readily be adapted to other drilling operations.

Material Eliminates Sealing Operation After Welding

An aluminum-colored "weld-through" sealer made available by Adhesives and Coatings Division, Minnesota Mining & Mfg. Co., Detroit 2, Mich., is applied to faying surfaces before spotwelding, thus eliminating the need for a sealing operation after welding, it is claimed. According to the manufacturer, the sealer, which does not interfere with the welding operation, is a heavy pastelike material that has the unusual property of resisting the heat and pressure of welding without splattering or burning, and is soft enough to uniformly squeeze away from the bottom weld when electrode pressure is applied, without flowing away excessively.

Auto manufacturers can use the material to seal the spot-welded joint between the roof and side panels, to seal along drip moldings, and to seal the joint between the rear quarter panel and the wheel housing. The sealer, it is claimed, shuts out air, dust, and moisture; withstands paint oven temperatures up to 475 deg. F., is not brittle at minus 10 deg. F.; does not support combustion; and protects metal from corrosion. It may be ap-

Chicago MOUNTED Wheels



...now even better with 79E BOND

the new miracle grinding wheel bond

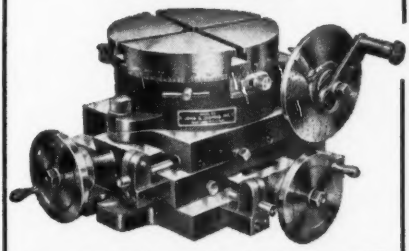
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Try Chicago Mounted Wheels—bonded with 79E Bond—and you'll never buy any other! This tough new grinding wheel bond, exclusive with Chicago Wheel, has taken the industrial world virtually by storm, doing a better grinding job faster.

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Dept. MMS, 1101 West Monroe Street, Chicago 7

No. 1 COMPOUND TABLE

With 7½" Dial Type Rotary Table Mounted



We also make a No. 2 Size for 12" Rotary Table. Can be had without Rotary Table.

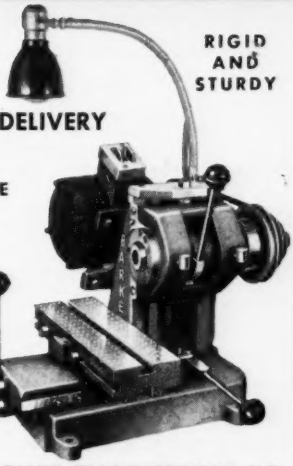
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Rotary Tables • Multiple Spindle Index Centers • Vises • Screw Machines Screw Head Slotters

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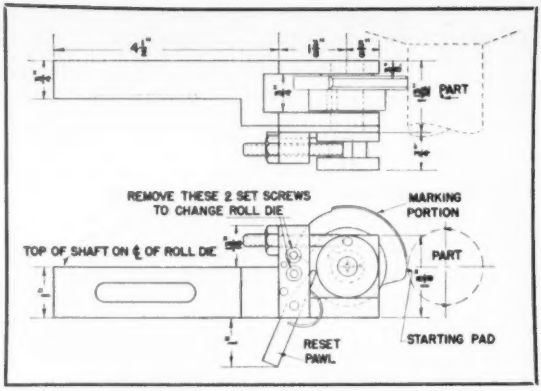


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CRITERION machine WORKS

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ⅜" to 1¾" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

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Drawing of New Method Improved Model 500-C Roll Marker

plied with a hand calking gun or pressure extruding equipment, or can be applied in small quantities with a scraper or putty knife.

Improved Roll Marker Assures Uniform Depth of Impression

By incorporating a standard inclined plane (or cam) starting pad on its Model 500-C roll marking die, a uniform depth of impression on parts is assured, according to New Method Steel Stamps, Inc., 149 Jos. Campau St., Detroit 7, Mich. This feature is also said to help the screw machine operator in tooling setup, since special cams or feeds on the machine are not required.

Other improvements in the Model 500-C include the location of center of roll die in line with top of shank for easier locating or holder during setup; simplification of ratchet pawl mechanism which is arranged to trip the roll-die to reset it during the last ⅛ to $\frac{1}{16}$ inch of the stroke; solid instead of split yoke construction; removal of only two Allen head set screws for replacing roll dies; elimination of drag of roll die or type face on marked surface; ability to use interchangeable type or solid roll dies (either centered or offset); and provision for full 360-degree starting point adjustment of die if required.

COMET

BORING, FACING, and INTERNAL THREADING TOOLS

For holes from ⅛" upward, 15 different sizes

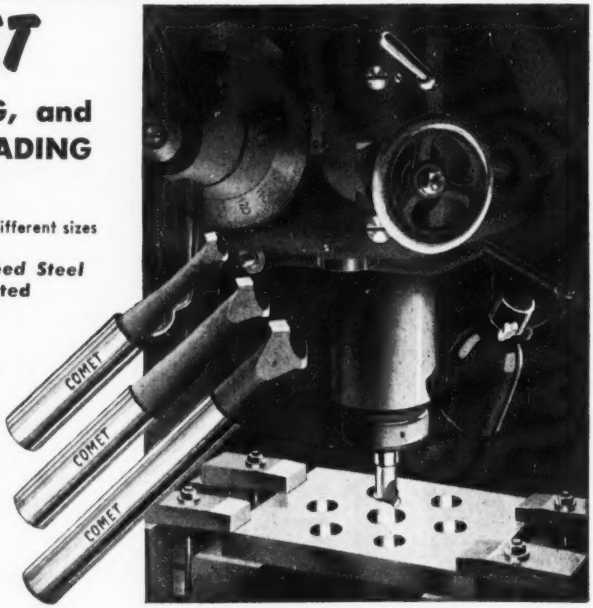
Made of Super-High-Speed Steel
Specially Heat Treated

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

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Comet Tool Co.

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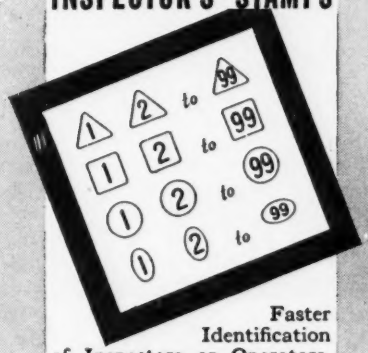
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• Compare this cross-section of a Leiman Air Pump with any other rotary pump. It is working air space that counts — and Leiman provides 2 to 3 times more area, per size and weight of pump.

What's your air application? Send us details. Leiman engineers offer over 60 years' experience on thousands of air applications.

CATALOG AND APPLICATION DATA SENT ON REQUEST.
***For Pumps—write* DEPT. A.**

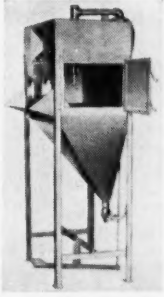
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HANDLE your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space — run at lower r.p.m. — have fewer moving parts—no springs, gaskets or packing—no tips to renew—nothing to give trouble.

Metal Cleaning and Finishing without acids or scratch brushes

LEIMAN SANDBLASTS

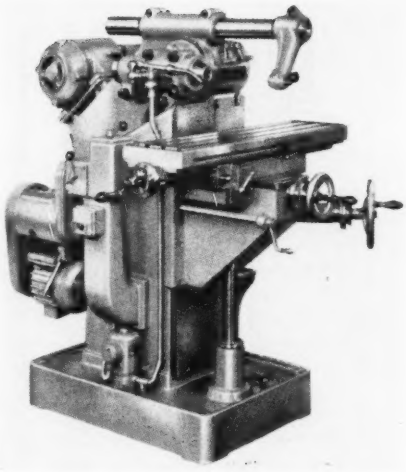
Fast, low-cost, safe, uniform way to clean scaly, rusty, rough surfaces—prepare for plating and finishing — stencil letters and designs — more rapid matte or satin finishes. Use unskilled help. For Sandblasts—



write DEPT. B

Combination Vertical-Horizontal Miller Has 12 Speeds and Feeds

Identified as the VHF-2, a milling machine which combines the working scope of a vertical and horizontal miller is now being offered in the Eastern, Southern, and Midwestern states by Ernest Gottschalk Co., Inc., 401 Broadway, New York 13, N. Y. The spindle of the machine can be located at a right angle to the longitudinal center line of the table and is adjustable for any angle from 0 degrees



VHF-2 Combination Vertical-Horizontal Milling Machine

in the horizontal plane to 45 degrees in the vertical plane. The adjustment of the spindle is easily and conveniently effected by turning the spindle housing and shifting the upper part of the driving mechanism belonging to it along the slanting upper side of the frame with an adjustment screw. Due to the slanting form of the top of the frame, the spindle nose retains the same long distance from the table in both horizontal and vertical positions.

The spindle is mounted in SKF roller bearings. The gears of the gearbox operate in oil, and the shafts of the gears are mounted in roller bearings. Power is transmitted from the gearbox to the spindle by a spiral-toothed gear transmission.

The machine is standardly available

Columbia

TOOL STEELS for all tools for all purposes

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COLUMBIA TOOL STEEL COMPANY

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

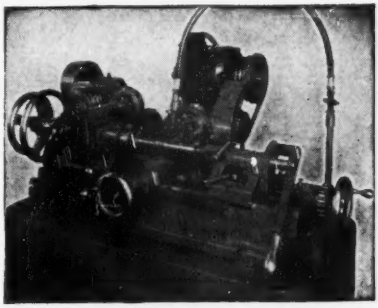


IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

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THREAD MILLING MACHINE

Also Pinion and Gear Cutting Machines, Cylindrical Sub-Presses, Cutter Sharpening Machines, Small Special Machinery. Cutters for thread milling and gear cutting.

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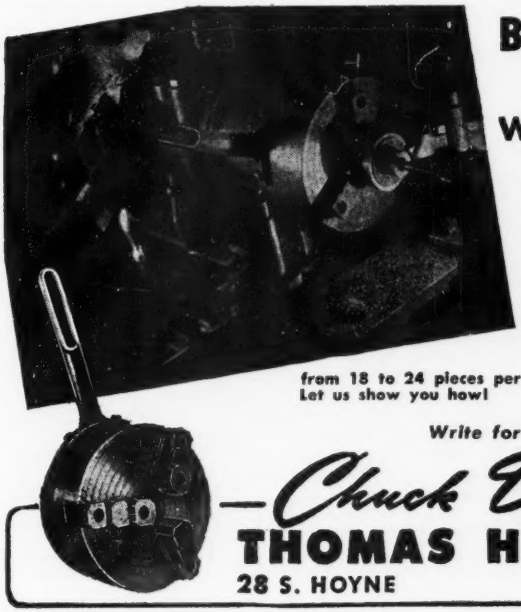
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WRENCHLESS CHUCK

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in your plant too. Let us show you how!

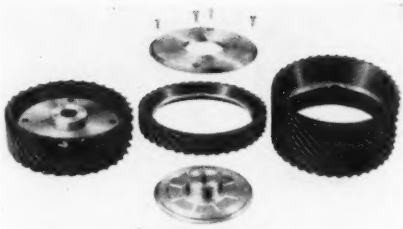
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Chuck Division
THOMAS HOIST CO.
28 S. HOYNE CHICAGO 12

with a Morse No. 4 taper spindle; however, it may also be obtained with spindles having other tapers. The machine, which is furnished complete with coolant equipment, has 12 speeds and 12 feeds and is powered by a 2 h.p. motor. The table is 36 x 10 inches in size, and the distance between the center of the spindle and the table ranges from 0 to 20 inches.

Universal Hub Contact Wheel Has Replaceable Tire

Designed to reduce contact wheel costs, a universal hub contact wheel announced by The Carborundum Co., Dept. MMS, Niagara Falls, N. Y., consists of a three-part bolted metal assembly which includes a flanged universal hub, a T-61 serrated rubber tire, and a side plate. The tire, when worn out, is discarded and replaced by a new tire at half the cost of a standard new contact wheel replacement, it is claimed.



Exploded view of Carborundum Universal Hub Contact Wheel

A single universal hub and plate unit is said to mount a variety of T-61 rubber tires of from ¼ up to 6 inches in width and from 5 to 105 durometer in hardness. This feature of interchangeability means that a single universal hub will accommodate up to 144 different tires of varying width and/or durometer. The interchangeable feature thus permits the performance of operations ranging from rough belt grinding down to the finest finish grinding on flat surfaces or contoured parts employing the same basic universal hub without removing the hub from the spindle. Each part of the universal hub assembly—hub wheel, plate, and tire—is separately balanced. Thus, all hubs, plates, and serrated rubber T-61 tires are not only interchangeable but are in balance in any combination of assembled contact wheel units.

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DRILL and PILOT BUSHINGS
Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. *Write for details.*

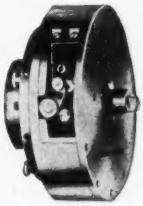
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1300 Mt. Elliott Ave. Detroit, Mich.

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For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".

DESTACO DETROIT STAMPING COMPANY
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M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

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Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on your present equipment with

THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

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Handy NEW 6 in 1 Wrench for Socket Screws

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(Actual Size)

No worry about losing socket screw wrenches with Hex-Uni-Key. Now wrenches for the six most popular sizes are always ready for instant use —in one unit. Wrenches hardened, tempered and tested for long life. Special deformed end to prevent loosening in holder.

FITS SET SCREWS
From No. 8 to 7/16"

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A UNIVERSAL SOCKET SCREW WRENCH FOR:

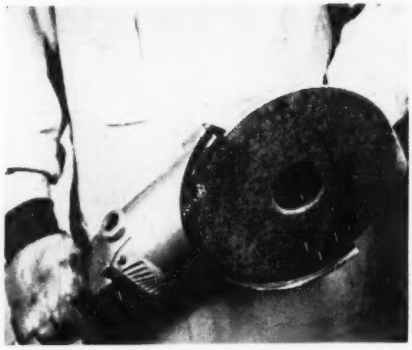
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EKLIND TOOL & MFG. CO.
2627 N. Western Ave., Chicago 47, Ill.

Wheel Is Designed to Rough and Finish Grind and Notch

Norton Co., Worcester 6, Mass., has announced a reinforced, flexible, hub-type grinding wheel known as the Norton BFR Wheel. With the BFR, an operator can rough grind, finish grind, and notch —all with the same wheel.

Designated for use on "right angle" or "sander" type portable grinders, the wheel is made of carded web material impregnated with abrasive grain. According to the manufacturer it is light, possesses urusual strength due to patented construction, is sufficiently flexible to permit blending of contours, and does a good polishing job. Generally, the wheel is used to smooth down welds, blend surfaces on contours, and notch risers in all kinds of castings. Unusual strength is achieved by a safety web built into the back of the wheel. Should breakage occur, the web is designed to hold pieces together until the machine can be stopped.



Norton BFR Grinding Wheel mounted on portable grinder

HIGH SPEED DRILLS
FLAT TWISTED AND ROLLED SECTION



Special Lengths and Types
PROMPT DELIVERY
Manufacturers Since 1903
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Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 1/8" to 3/4" U.S.S. Inexpensive — Last for years.

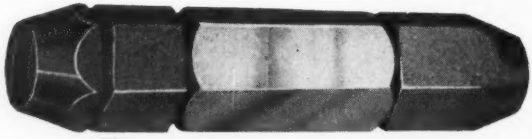


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NIELSEN TOOL & DIE COMPANY
P. O. Box 1067
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Live Center Is Said to Maintain Accuracy to 0.00005 Inch

Designed for use on lathes, millers, turret lathes, and other machine tools, the Quadro Precision Live Center now being marketed by Dakon Tool & Machine Co., Inc., 496 Broadway, Brooklyn 11, N. Y. is said to maintain rigid accuracy to 0.00005 inch. Two double-row precision preloaded ball bearings are claimed to absorb combined radial and end thrust. Ac-

COLLET TYPE PIN GAGE HANDLE
Bushings for cylindrical and thread plug gages.



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Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.
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AUTOM



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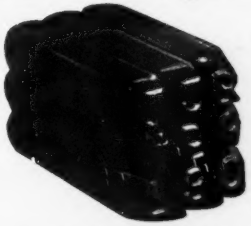
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Why THOR STAMPS Last Longer



. . . because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

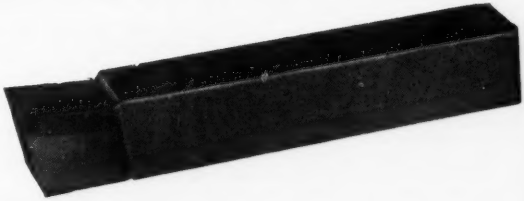
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"GENERAL PURPOSE" AND "STEEL"



Our "General Purpose" Carbide Tipped tools are used for most turning, facing and boring operations of cast aluminum and non-metallic materials. The "Steel" type are used for steel cutting.

Always tell us the material you are machining.
We will gladly quote you on your special carbide tools.

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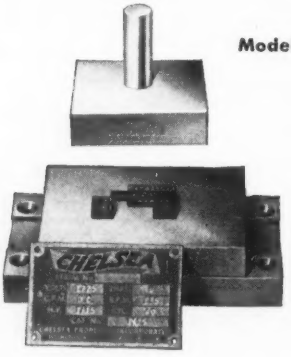
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CUTS THE COST OF STAMPING NUMBERS

DETAIL CHASE and PUNCH

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Model 24



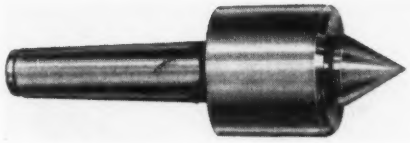
An ingenious tool for rapid stamping of plain, etched or embossed name plates. Used in a small Kick or Power Press, or in our No. 93 or No. 131 Bench Press. Plate to be marked is laid face down on gauge. Flat punch fitted in ram of press makes the impression. Recesses in chase register with blank spaces on name plate. Steel Type and Logo Type are dropped into recess, and because not fastened, changes can be made quickly. Logo Type are used for numerical and letter combinations such as 110, 220, 1250 and AC, DC, etc. With Logo Type, changes are made faster than with single type.

All lines are stamped in one operation, making tool very efficient. Small, as well as large lots can be stamped economically, neatly.

Send sample of Plate or check, and list of type required for price estimate.

Write for Bulletin MS-24

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.



Quadro Precision Live Center

cording to the manufacturer, the center is designed to support heavy loads at high speeds for long periods of time and has an unusually long service life.

Strapping and Masking Tapes

Behr-Manning Corp., Troy, N. Y., has announced the addition of two new items to its line of "Behr-Cat" Brand Pressure Sensitive Tapes. Behr-Cat Brand No. 211 Strapping Tape is a glass filament reinforced tape specifically designed for heavy duty service in the fields of strapping, packaging, banding, and carton sealing. Of extremely high tensile strength and resistance to handling wear, this tape, it is claimed, expedites packaging operations, assists in the binding of odd shaped or contoured bundling, and is a most important alternate for use where metal strapping is subject to curtailment or a weight factor. Powerful adhesion to both porous and smooth surfaces is said to make it excellent for use in wrapping together many small parts for shipment.

Behr-Cat Brand No. 113 Masking Tape has been developed especially for the difficult operation of masking off areas on anodized aluminum and magnesium as well as castings of these materials and their alloys, particularly where such parts are to be subjected to high temperatures.

"Behr-Cat" Brand No. 211 Strapping Tape





ENCLOSURE SAFGUARD

FOR PUNCH PRESSES

STRAND MFG. CO.

DEPT. A, P. O. BOX 762
LOS ANGELES 44, CALIF.

ATLANTIC GEARS

SPUR
SPIRAL
WORM
BEVEL
GEARS
GENERATED WITH PRECISION ON MODERN EQUIPMENT

SEND SAMPLES OR BLUEPRINTS FOR QUOTATION

ATLANTIC GEAR WORKS, INC.

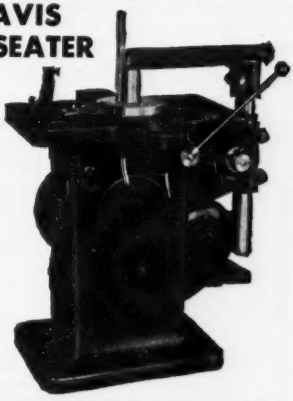
198A LAFAYETTE ST. • N.Y. 12, N.Y. CA 6-1440

Why Use A Shaper to cut Keyways when a DAVIS KEYSEATER

will do the job so much quicker and better?

•

Send for Circular

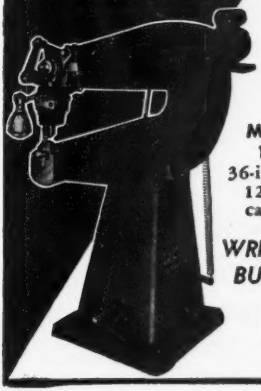


DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

Libert Hi-Speed SHEAR

CIRCLE CUTTING ATTACHMENT Included as STANDARD EQUIPMENT with this Machine



MODEL 1236
36-in. throat.
12-gauge capacity.

WRITE FOR BULLETIN

SIMPLIFIES Maintenance
SPEEDS Production
SAVES Manpower

The *Libert* has amply proved its advantages by turning out top production—shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

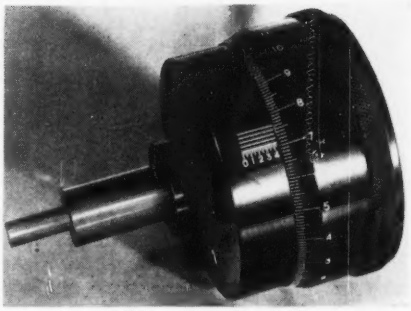
Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY
Green Bay, Wisconsin

Micrometer Head Features Non-Rotating Spindle

Reading directly in tenths and by vernier to 0.000025 inch, a micrometer head announced by Boeckeler Instrument Co., Dept. MMS, 39 E. Rillito St., Tucson, Ariz., has a spindle which does not rotate as it is advanced or retracted. Such a non-rotating spindle is said to lend itself to special applications, and chisel or other special shaped anvils can be easily provided. The lead screw, ground from the solid and hardened and normalized, is

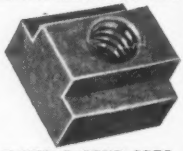


Boeckeler Non-Rotating Spindle Micrometer Head

claimed to have an overall accuracy of 0.000050 inch in pitch throughout its working range. Compensation is provided by the dial-mounted scale and vernier, which is individually set as each instrument is calibrated. According to the manufacturer, this individual setting of each head is to an accuracy of 15 millionths inch.

Designed for mounting to any mechanical or electronic device where accurate linear measurement or control is required, the head, as a result of the non-rotating spindle feature, is said to eliminate wear between the spindle and the part against which it bears. Internal wear is minimized by the use of a tungsten carbide disc and ball contact. Adjustment is provided for lead screw tension, thus eliminating backlash in either direction of rotation, it is claimed. The aluminum barrel and thimble have a black anodized finish with white lines and figures. The head measures 3⅝ inches in diameter and is 5 inches long with the spindle fully retracted.

SEND FOR FREE CATALOG TODAY



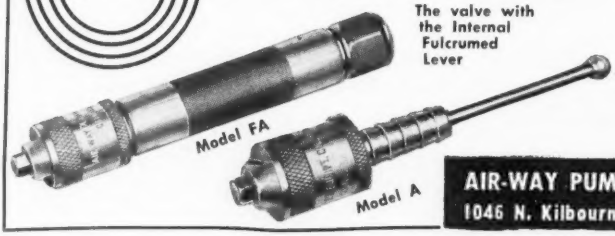
QUARTER TURN SCREWS
SHOULDER SCREWS
DOUBLE END JIG FEET
SCREW TYPE JIG FEET
PRESS TYPE JIG FEET
FLANGED NUTS
CUT THREAD STUDS
TEE-NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
HEXAGON TYPE HAND KNOBS
KNURLED HEAD SCREWS

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

Northwestern
119 HOLLIER AVE., DAYTON 3, OHIO

Whiton
CENTERING MACHINES
Send For Bulletin C 1
THE WHITON MACHINE CO. New London Conn.

Air-O-chek... FOR AIR AND LIQUIDS
The valve with the Internal Fulcrumed Lever



An invention in value means

Hundreds of thousands are in use in leading factories, machine shops and foundries. See your jobber or write direct for full details.

AIR-WAY PUMP & EQUIPMENT CO.
1046 N. Kilbourn Ave. Chicago 51, Ill.



GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Pioneer Award Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO.

Box 596, Philadelphia, Pa.

T. H. LEWTHWAITE MACHINE CO.



METAL LATHERS' BENDER

This machine will bend up to ⅛" square or round iron, 2" x ⅛" channel iron, 2¼" x 5/16" flat iron cold. Weight 40 lbs.

Circular on Request

317 EAST 47TH ST. NEW YORK CITY
PLaza 8-0380

FOR SMALL

JIG BORING

PUT SMALL JOBS ON THIS

LINLEY MACHINE

and save your larger machines for heavier work.

YOU'LL BE SURPRISED!

at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7" x 17½" table size.

Write TODAY For Bulletin J

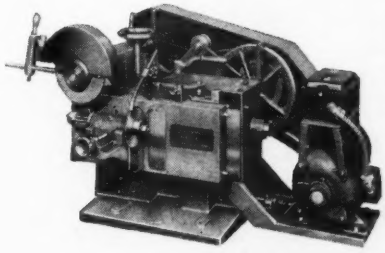


LINLEY BROS. COMPANY

663 State St. Ext.
Bridgeport 1, Conn.

SHARPENS SAWS IN GANGS FOR LESS THAN *5¢ A PIECE

35 T AUTOMATIC METAL SAW GRINDER

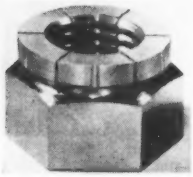


* If you have been accustomed to paying 20¢ or more to sharpen small millers or screw slotting saws, then the 35 T is a machine that deserves your close attention.

It's low in cost, is automatic in operation and has a capacity for small saves from 2 to 5½" diameter. For details, write for Bulletin 35 T. The Wardwell Mfg. Company, 3166 Fulton Rd., Cleveland 9, Ohio.

WARDWELL

Maker of largest line of saw and tool sharpening machines



"Flexloc" Lock Nut

Lock Nut

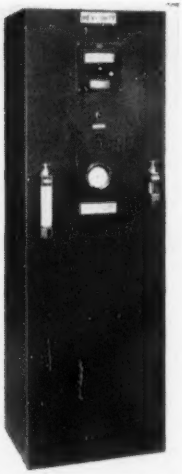
The "Flexloc" Nut now being manufactured by Standard Pressed Steel Co., Box 556, Jenkintown, Pa., can be used continuously in temperatures as high as 550 deg. F., it is claimed. Since the nut is made entirely of steel, its locking efficiency is said to be unaffected by relatively high temperatures.

The top of the nut is slotted into six flexible segments. When the nut is run on a bolt or other threaded member, the segments grip the threads with an action similar to that of the jaws of a chuck.

Atmosphere Generator

Product of Hevi Duty Electric Co., Milwaukee 1, Wis., the Hevi Duty Type M-5724-S "Atmo-Gen" Atmosphere Generator illustrated herewith is intended to provide atmospheres for the following heat-treating operations: clean non-decarburized hardening, dry cyaniding or carbonitriding, carburizing (carrier gas), copper and silver brazing, nitriding, sintering and bright annealing. The unit is said to deliver 150 cubic feet of atmosphere per hour.

The Atmo-Gen consists of an ammonia cracker which is housed in a fabricated steel cabinet. The complete unit includes an electric tube type furnace with automatic temperature control, catalyst filled alloy retort, necessary piping, and flow regulation accessories.

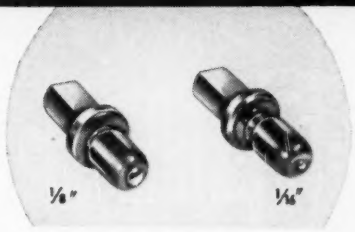


Hevi Duty Type M-5724-S "Atmo-Gen" Atmosphere Generator



FOR GREATER HARDNESS TESTER ACCURACY
Specify CLARK STEEL BALL PENETRATORS

• For dependably accurate hardness testing, every part of your testing equipment must be designed by experts. CLARK Hardened Steel Ball Penetrators are designed to give the most accurate possible results in the testing of soft metals such as unhardened steel, cast iron, brass, bronze, and similar metals and alloys. They are available in 1/16", 1/8", 1/4", 1/2", 3/4", and 1" diameters. Specify CLARK Steel Ball Penetrators for more accurate "Rockwell" testing.



CLARK
TOMORROW'S ACCURACY TODAY
INSTRUMENT, INC.
10200 Ford Road **Dearborn, Mich.**

QUADRO
PRECISION LIVE CENTERS
GUARANTEED ACCURATE TO .00005"



The **QUADRO PRECISION LIVE CENTER** is designed to support the heaviest load at highest speed for the LONGEST TIME—and will outlast dead centers many times over!

Each **QUADRO CENTER** eliminates friction and two double row precision pre-loaded ball bearings absorb combined radial end thrust. In use on a lathe, miller or any other machine tool, it will give you every penny's worth in production.

See your regular supply dealer for complete information, or write to:

DAKON **TOOL & MACHINE CO., INC.**
496 Broadway, Brooklyn 11, N. Y.

"TWO DECADES OF IMPORTANT TOOL PARTS PRODUCTION"

CUT DRILL SHARPENING AND DRILLING COSTS—50%

BLACK DIAMOND

PRECISION DRILL GRINDER—FOR ALL SMALL DRILLS

When you need sharp, small gauge or fractional drills in quantities—it costs real money to put an experienced mechanic to work on them.

With a Black Diamond, however, anybody can keep all small drills sharp, ready for any emergency—with lips accurately ground to exactly the same length, proper angle and with correct clearance for fast, precision drilling.

This motor-driven machine cuts grinding and drilling costs 50% and more, saves expensive drill stock, reduces work spoilage and drill breakage.

The built-in Diamond Point Dresser keeps the grinding wheel ever sharp cutting and the Web Thinning Attachment cares for all types of Notched points to perfection.

WRITE FOR MORE COMPLETE DETAILS.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE, NATICK, MASSACHUSETTS

Retriever Facilitates Handling of Heavy Broaches

Designed to facilitate the handling of heavy broaches on pull-down operations, a new style retriever for its T-Type three-way broaching machine has been announced by American Broach & Machine Co., Ann Arbor, Mich. Simplified in design and sturdier in construction, the new unit, according to the manufacturer, has an improved performance, is

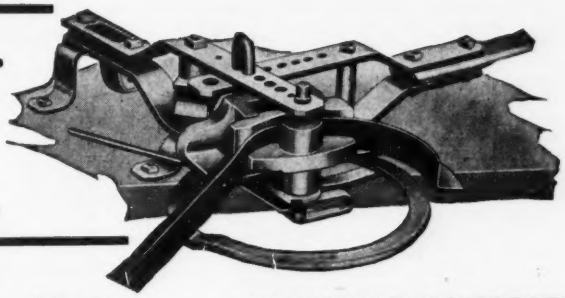
American T-Type Three-Way Broaching Machine with new style broach retriever

more rigid under stress of operation, and provides for easier servicing than the previous retriever.

Versatile Flooring Material Minimizes Production Delays

Known as "Trowel-In," a flooring material, which, it is claimed can be used to both repair and resurface floors of practically any composition, including concrete, stone, and brick, has been developed by Flexrock Co., 3699 Cuthbert St., Philadelphia 4, Pa. The material is supplied ready for immediate use and is said to require no heat or special skill in application. Trowel-In repairs are

ONE MAN...
bends 2" x 2" x 3/16"
Angle Iron
EASILY...



with the . . . HYDRAULIC POWERED
HOSSFELD UNIVERSAL IRON BENDER

Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

Write NOW . . . for Complete Details!

HOSSFELD MANUFACTURING COMPANY
DEPT. MMS • WINONA, MINNESOTA

CARBOLOY TIPPED SCRAPER BLADES

Available in three widths

THEY LAST 8 TO 10 TIMES LONGER



Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

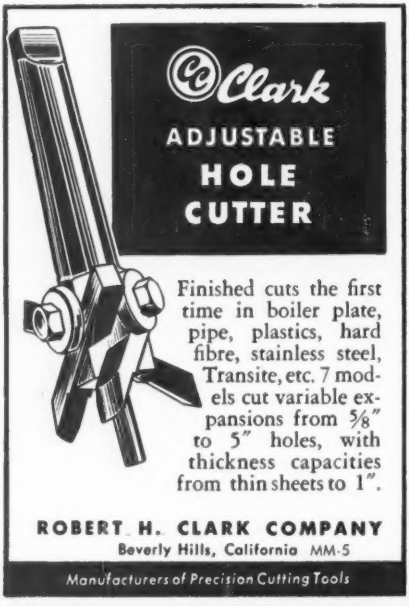
Write for Bulletin 5-22

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

claimed to be ready for traffic in 18 hours.

As a resurfacing material, Trowel-In, according to the manufacturer, requires a thickness of application of only $\frac{3}{8}$ inch, with the result that it does not appreciably raise floor level. As a patching material, Trowel-In is said to provide efficient feather-edge repairs without chopping out the old floor. The material is claimed to aid in leveling linoleum and tile and to help set floor plates and drains. Designed to protect surfaces from water, moisture, and vibration, the material, it is stated, trowels-in easily around machine bases, pipes, and so on, and shows no shrinkage cracks.



Latch Bolts, Spherical Washers, and Fixture Keys

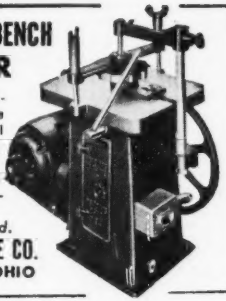
Northwestern Tool & Engineering Co., 119 Hollier Ave., Dayton 3, Ohio, has announced the addition of three new items to its line of jig and fixture components for reducing set-up time on jig borers, milling machines, slotters, planers, boring mills, punch presses, and so on. These items include cyanide hardened latch bolts in sizes of $\frac{3}{8}$-16, $\frac{1}{2}$-13 and $\frac{5}{8}$-11; hardened spherical washers in sizes of $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ inch; and fixture keys with black Pentrate finish in sizes of $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$ and $\frac{13}{16}$ inch.



Northwestern Latch Bolt, Spherical Washers, and Fixture Key

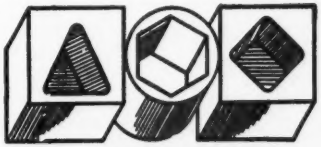


READING BENCH KEYSEATER



Portable—move directly to job; a time saver for both small and large shops. 3¾" stroke; adaptable for other work. Low first cost—prompt delivery. *Good dealers wanted.*

READING MACHINE CO.
CINCINNATI 37, OHIO



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

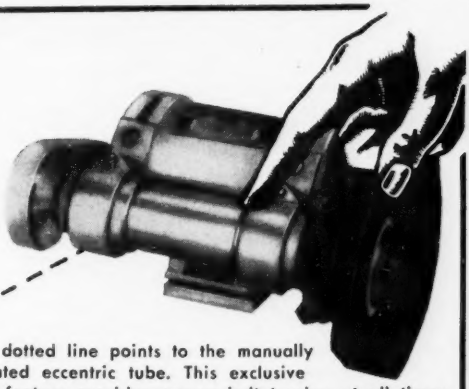
GRANT RIVETERS

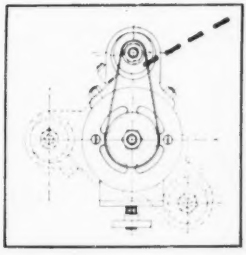


• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. *Write for literature—and don't forget to send samples.*

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

THEMAC GRINDERS





The dotted line points to the manually operated eccentric tube. This exclusive THEMAC feature provides proper belt tension at all times. The sketch to the left illustrates the circumferential adjustment of Spindle Assemblies.

You can do any type of internal or external grinding, on any size lathe. The interchangeable spindle extensions make THEMAC Grinders a tool of many uses.

Write for catalog describing other features.
Sold through your local mill supply distributor.

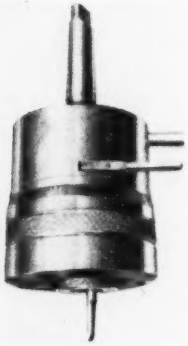
THE McGONEGAL MANUFACTURING CO.
135 MOZART ST. • EAST RUTHERFORD, N. J.

Profiling Head Permits Turning of Internal and External Profiles

Alina Corp., 32 Broadway, New York 4, N. Y., is now marketing a profiling head, designated as the Model 30, which permits the turning of both internal and external profiles, provided the forms of such profiles allow the tool bit to be engaged in a continuous cut. Built for heavy duty operation, the body of the attachment is drop forged and all movable parts are case hardened.

The Model 30 can be used in turning square, hexagonal, octagonal, and other polynomial profiles. Specific products which can be produced with the head include profile collets; stamping, drawing and forging dies; gages; special tools; and other products. The head can also be used to machine cylindrical and taper forms (stamp and die tapers).

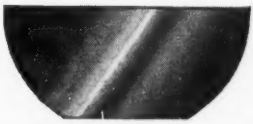
To use the Model 30 head, a templet of the form which is required in the finished product is inserted in the head, the design of which allows for easy interchangeability of these templetes. The templets are approximately ¼ inch thick and can be easily made in the shop. One templet permits the machining of an unlimited number of pieces, the dimensions of which may vary as much as ¾ inch, this being the capacity of the adjusting barrel. Complicated profiles are machined by using progressive templets. The form of the templet is transmitted to the workpiece by a roller guide. An ordinary boring tool bit may be used for turning of profiles, thus eliminating the need for special tools. The provision of a



Alina Model 30 Profiling Head



WOODRUFF KEYS



We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as ⅛" x 1/16" to keys as large as 3½" x ¾". All keys are carefully checked for burrs, slivers, etc. before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

STANDARD STEEL SPECIALTY COMPANY

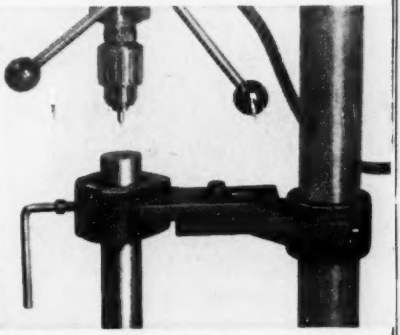
BEAVER FALLS PENNSYLVANIA

PLANTS: BEAVER FALLS, PA. • HAMMOND, IND.

CENTER-IT

A low-cost drill press centering device . . .

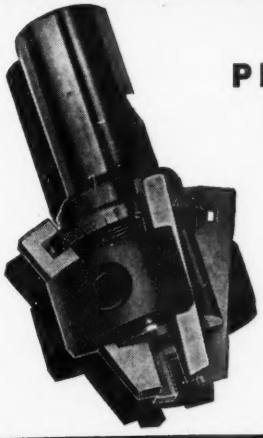
Speeds centering operations on Rounds, Squares, Hexagonals



UP TO 450 PIECES PER HOUR. Capacity up to 2" Diameter; Holds bars firmly; Simple set-up, large or small lots; Centers one or both ends; Accuracy on initial piece important. Pays for itself on first few jobs. Price $30 f.o.b. When ordering, state make of drill press.

CHAMPLAIN MOTORS, INC., St. Albans, Vt.

KUTMORE ADJUSTABLE HOLLOW MILLS



ENGINEERED FOR . . . PRECISION PRODUCTION

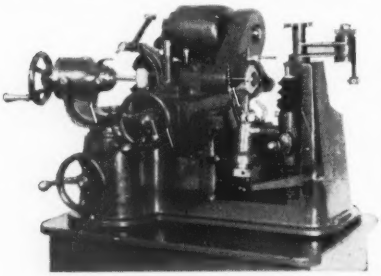
- ANY COMBINATION OF . . . TURNING . . . TAPERING . . . FACING . . . CHAMFERING . . . TREPANNING IN **ONE PASS.**
- EXCLUSIVE **MICROMETER** ADJUSTMENT FEATURE FOR RAPID SET-UP.
- CUTTING CAPACITIES FROM 1/32" TO 2" DIAMETER IN STANDARD STOCK. IMMEDIATE DELIVERY.

WRITE FOR CATALOGUE No. 20 MM

OUR ENGINEERING DEPARTMENT IS AT YOUR DISPOSAL ON YOUR HOLLOW MILL PROBLEMS

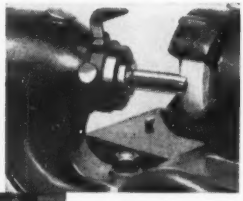
CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5, N. Y.

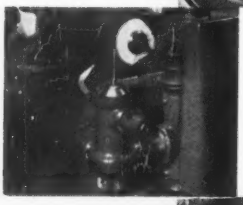
HYBCO
TAP GRINDER



MODEL 1100

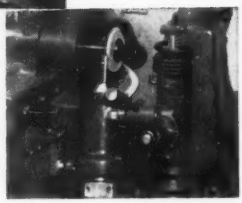
CHAMFER Sharpening





FLUTE Sharpening

GUN POINT Sharpening

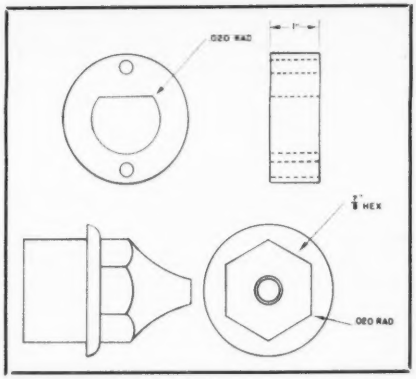


• Capacities No. 0 Machine Screw to 1½" Hand Taps.

Henry P. Boggis & Co.

708 East 163rd Street

Cleveland 10, Ohio



Sketch showing type of work which can be produced with Alina Model 30 Profiling Head

micrometer scale on the adjusting barrel is said to assure an accuracy of ± 0.0005 inch. The Alina Model 30 Profiling Head is said to machine profiles with corner radii of less than 0.02 inch.

Carbide Is Said to Be Excellent for Slow Speed Work

Identified as Grade S-6, a new grade of cutting carbide developed by Newcomer Products, Inc., Latrobe, Pa., is claimed to be highly efficient where the nature of the job makes small speeds necessary.

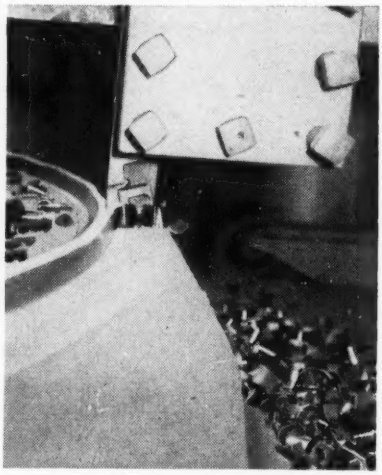


Illustration showing Newcomer Grade S-6 Carbide in use

USE ECONOMY

Headless Set Screws

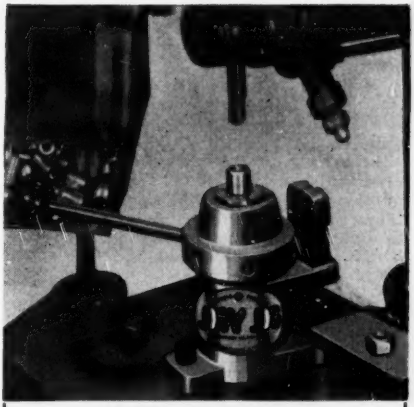
Socket Set Screws



Try Them On Your Next Job!

ECONOMY MACHINE PRODUCTS COMPANY

5212 Lawrence Ave., Chicago 30, Ill.



JIFFY JIG

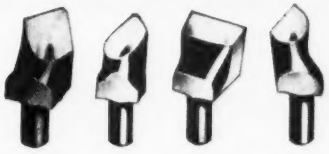
This fast, accurate, low-cost collet-type work holder speeds secondary operation drilling, milling, tapping, etc., either horizontal or vertical. • Guide bushing support (not shown) for cross hole drilling. • Spring ejector (optional) speeds work. • Simple, dependable, proven in service. Send for our folder.

RIGID PRODUCTS CO.

P. O. Box 162, Dept. M, Cincinnati 15, Ohio

APEX INSERTED-BLADE METAL-CUTTING TOOLS

APEX TOOL BITS FIT MOST STANDARD HOLDERS



A type for every job





If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Prompt shipments from our large stock. Write for catalog.

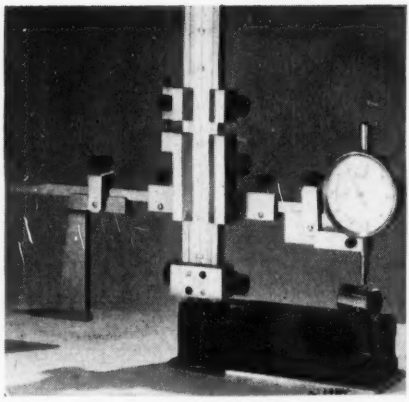
APEX TOOL & CUTTER CO., Inc. **SHELTON 15, CONN.**

Even though S-6 can be used at high machining speeds, its greatest tool life is said to be obtained at slow speeds, therefore making the carbide especially suitable for use on old or slow speed machines.

According to the manufacturer, S-6 is excellent for interrupted cuts and removes stock quickly because of the heavy feeds permissable. The carbide is claimed to be ideal for machining armor plate, rough steel forgings, castings, army tank parts, and other products.

Height Gage Features Movable Differential Scale System

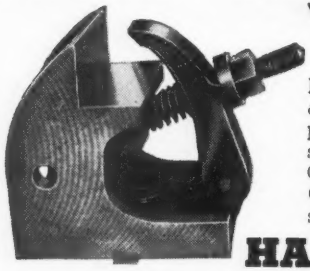
Brand Tool & Supply Co., 907 S. Victory Blvd., Burbank, Calif., has introduced a universal precision height gage with movable differential scale system for measuring and marking at any point up or down. With a special dial indicator holder, the unit may be used as a dial platform gage. The graduations on the right side of the gage provide the absolute measurement from the measuring surface (surface plate). The graduations on the left are contrariwise; i.e., running downward in series of 5 inches (0 to 5 inches).



Brand Universal Precision Height Gage

The height gage is made in three sizes of 20, 30, and 40 inches. The well made vernier part of the gage is precision fitted and, with its fine adjustment, provides for easy and accurate positioning of the long square scriber, which is hardened, ground, and lapped. The scriber is adjustable so that it can be pushed out

HART MILLING FIXTURES

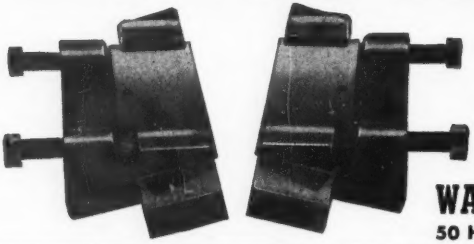


"Masters of 1000 Setups"

Little need for Expensive Jigs or Fixtures

Fixtures make themselves popular and profitable in any shop—are used in either horizontal or vertical position. Will hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on bottom as well as on back. Generally sold in pairs. Made in 4 sizes—to hold stock from ½ to 5 inches.

HART MACHINE VISE JAWS



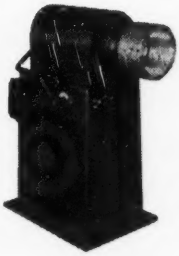
These Jaws are very useful on any machine table. They clamp or bolt to the table, the angles firmly holding the work down. Each hardened tool steel jaw measures 3"x6"x½". The angle edges are serrated.

Write for illustrated folder & prices.
We also manufacture Hart Index Centers.

WALTER W. FIELD & SON, Inc.

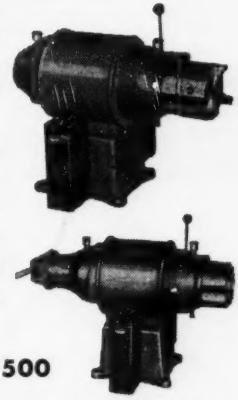
50 Hayward St., Cambridge 42, Mass.

SCHAUER SPEED LATHES



The fastest, most economical method of filing, de-burring, polishing or lapping small metal and plastic parts.

There's a Schauer Speed Lathe to solve every individual secondary finishing operation. Chuck, collet or vacuum holding fixtures. Single, two speed or variable speed motors. Bench and pedestal models.



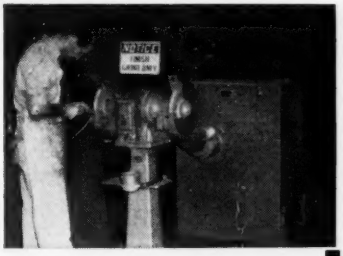
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STOP DUST

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Low cost, immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

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ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

Write for Catalog and Prices on Complete Reid Line

REID TOOL SUPPLY CO.
709 BAKER ST. MUSKEGON HTS., MICH.

to measure 8 inches beyond the height gage base on the 20-inch height gage. The height gage base is hardened and precision finish ground on the top, and serves as a platform when attaching a dial indicator by means of an available attachment. For scribing from zero, a hardened and precision ground offset scriber is available.

Tool Stands Have Many Uses

Monarch Metal Products, Inc., 724 S. Columbus Ave., Mt. Vernon, N. Y., is now manufacturing a line of tool stands



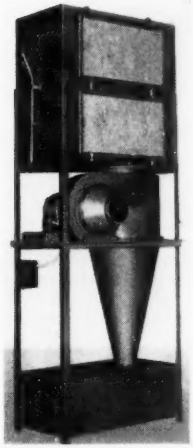
Monarch One-Drawer Tool Stand

suitable for factories, machine shops, toolrooms, office use, shipping and maintenance departments, laboratories, and so on. The line includes a tool stand without drawers; tool stand cabinet: one-drawer stand; two-drawer stand; two-drawer stand with compartment; and four-drawer stand.

All models can be obtained with or without steel swivel casters. The height of all models except the tool stand is 35 inches with casters (tool stand cabinet, 37½ inches with casters). Padlock hasps are provided on all drawers. The standard color for each stand is gray; however, an optional color of green is available.

Dust Collector With Large Capacity Storage Requires Minimum Floor Space

A large capacity industrial dust collector which requires only 8 square feet of floor space yet is capable of collecting the dust from as many as ten grinding wheels in simultaneous operation has been announced by Aget-Detroit Co., 207 Main St., Ann Arbor, Mich. The collector, designated as the Dustkop Model 3050, has a rated capacity of 3,630 cubic feet of air per minute at a static suction of 6 inches measured on an 8-inch inlet pipe.



Dustkop Model 3050 Dust Collector

The dirt-laden air is drawn into the collector by means of a self-clearing paddle wheel fan which is driven by a 5 h.p. motor. The first stage cleaner is a cyclone separator of predetermined operating efficiency; a second-stage cleaning is effected by means of a heavily compressed fiberglass filter which cleans the air and permits its return to the working space for a consequent saving of heat.

Installation requires only the locating of the unit and connecting to electrical power and the piping system. Being entirely self-contained, the unit is portable and can be moved as subsequent changes in production setup are made. Floor size of the unit is 29 x 50 inches, with the overall height being 132 inches. The dust collector is available for operation on either 220 or 440 volt three-phase 60-cycle power.

THRIFTMASTER
Fixed Center
DRILLHEADS



setting the Defense pace with Outstanding

PERFORMANCE

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- Fully hardened Chrom-Moly Steel Gears, Spindles & Drives
- Built to Precision Standards

Dependable Delivery Promises

ALSO

Adjustable Drillheads of Standard Universal Joint and Gear Driven Eccentric Type. Automatic Reverse Tap-Or-Drill Units.

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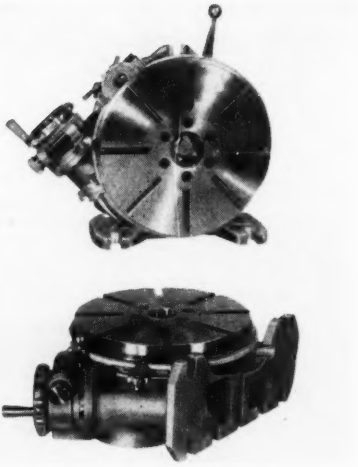
Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

THRIFTMASTER *Products Corporation*

Subsidiary of Thomson Industries, Inc.
1040 N. Plum St., Lancaster, Pa.

Optical Indexing Table

Product of F. T. Griswold Mfg. Co., Wayne, Pa., the Griswold Indexing Table illustrated herewith is designed to provide a high degree of accuracy when used in connection with milling machines, jig borers, diesinkers, and similar machines for indexing and rotary milling. The table, which may be used either in a vertical or horizontal position, includes a high precision engraved glass degree scale that is observed directly through a compact telescope which, in conjunction with a circular dial, is said to make possible readings accurate to 0.0005 inch at the periphery of a 12-inch circle.

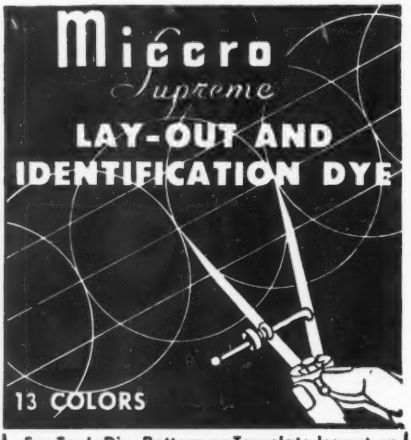


Griswold Indexing Tables

The turntable is supported at its periphery about its entire circumference. The forged spindle is mounted on a specially selected preloaded taper roller bearing. Anti-friction bearings are used for all rotating shafts. A clutch permits hand rotation of the turntable to facilitate positioning.

Unit Designed for Filtering Liquids Used in Leak Test Tanks

The accompanying illustration shows a compact combination pump and filter unit designed for filtering water and other liquids used in leak test tanks. Marketed by The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio, this spe-



For Tool, Die, Pattern or Template layout on metal... Quick identification of bar stock, sheet, strips or parts... Shows up in sharp relief—dries instantly... Write for sample and circular on company letterhead.

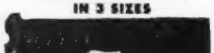
MICHIGAN CHROME & CHEMICAL COMPANY
6340 E. Jefferson Ave. • Detroit 7, Mich.

SAVE
TIME and MONEY
with
GARBERDING

STOP-PINS
AVAILABLE IN 5 SIZES



FINGER STOPS
IN 3 SIZES

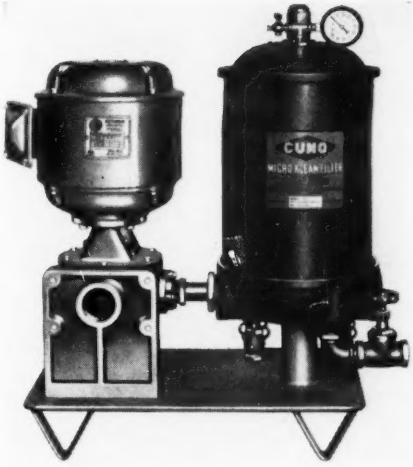


STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices.

GARBERDING FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit.

Write for literature

TWENTIETH CENTURY MANUFACTURING CO.
3724 MONTROSE AVENUE CHICAGO 18, ILLINOIS



Ruthman No. 48380 Combination Pump and Filter Unit

cific unit, which is designated as the No. 48380, is intended for filtering the liquid used in testing refrigerator compressors.

Suitable for tanks up to 1,000 gallons, the semi-portable unit includes a bronze Rumaco Model 2-C pump having a 1½ h.p. heavy duty driving motor and a capacity of approximately 2,000 gallons per hour at 36 lb. pressure, which provides for complete circulation of the liquid through the filter twice each hour. The filter is a bronze Cuno Micro-Klean 6-A1 with six cartridges (No. 2278F1) of medium density.

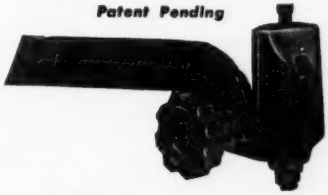
Scored Abrasive Refill Cartridge for "Sand-O-Flex" Sander

Merit Products, Inc., 4023 Irving Pl., Culver City, Calif., is now supplying a "scored" abrasive refill cartridge for use with its "Sand-O-Flex" Brush-Backed Contour Sander. Particularly useful in finishing small, irregular parts, the refill cartridge, as shown at the right in the accompanying illustration, is made up of several strips of abrasive cloth wound around a central core, the abrasive cloth being cut in staggered rows to give it pliability. In use, the strips unwind and are backed by brushes which "cushion" the abrasive, forcing it over intricate shapes as shown at the left in the illustration.

Specially made for use in Sand-O-Flex

Monarch Precision
SHAPLANE
Radius Tools

Patent Pending



Five Models for

LATHES, SHAPERS, PLANERS, AND BORING MILLS.

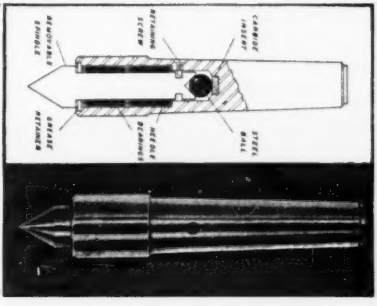
RANGE ½" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

C. B. TEETER
Tool Room Specialties
4470 Oakenwald Ave., Chicago 15, Ill.
Phone Drexel 3-3571

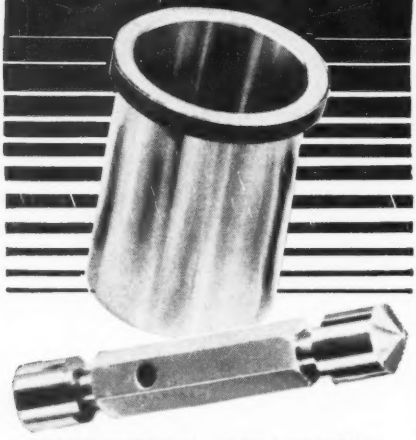
Deeper Cuts — Faster Speeds

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Exclusive SMALL HEAD design of WEE Live Centers combines live center advantages with size and accuracy of dead centers. 30 to 40% less overhang means deeper cuts, faster speeds, no chatter. Used by hundreds of leading concerns. No. 2 M.T., $21.00. Request complete price list.
Write direct, if distributor cannot supply you.
HERBERT CROSS & SON, Bala-Cynwyd, Pa.



FOR ACCURACY IN PRODUCTION



ECONOMY PRECISION BUSHINGS AND GAGES WORK HAND IN HAND



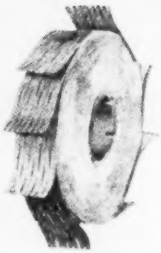
- A.S.A. standard and special drill jig bushings.
- A.G.D. plug and ring gages, both new and chrome plate.
- Gages salvaged by hard chrome plating.

Write for bulletin and price list.

Economy TOOL & MACHINE CO.

1827 S. 68TH ST., MILWAUKEE 14, WIS.





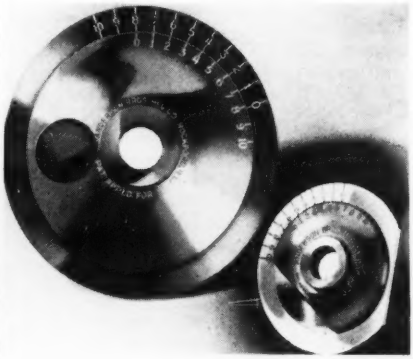
(Right) "Sand-O-Flex" Scored Abrasive Refill Cartridge. (Left) illustration depicting application of "Sand-O-Flex" Contour Sander equipped with scored abrasive refill cartridge

wheels only, the scored abrasive refill cartridge is available in garnet and aluminum oxide cloth in a wide range of grits.

Device Aids Static Balancing of Wheels

For use in conjunction with boring, grinding, and buffing lathes for quickly bringing into balance grinding, polishing, or buffing wheels, Anderson Bros. Mfg. Co., 1907 Kishwaukee St., Rockford, Ill., has introduced the Speedi-Balancer illustrated herewith. With this device, wheels can be removed and replaced without adding or removing weights. The wheel is marked showing the setting of the Speed-Balancing discs, and anytime the wheel is removed from or replaced on the lathe, the Speedi-Balancer is merely

Anderson Speedi-Balancers



set according to the marking on the wheel.

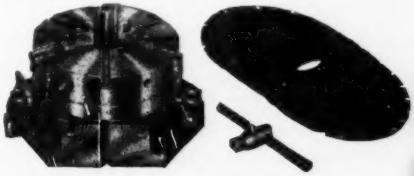
The Speedi-Balancer is made to fit arbors from ½ to ⅞ inch and from 1 to 1¼ inches in size. The smaller size Speedi-Balancer is referred to as the No. 10 and the larger size as the No. 15. Arbor sizes are designated by the fractions.

Chucking and Indexing Fixture Has 12-Inch Capacity

The Hartford Special 12-Inch Super-Spacer announced by The Hartford Special Machinery Co., Hartford 12, Conn., is described as a rugged, accurate, rapid indexing device which can be readily adapted to a variety of short or long-run operations. The device is furnished complete with a 48-notch master index plate; a set of eight mask plates for 2, 3, 4, 6, 8, 12, 16, and 24 divisions; and a T-handle socket wrench. Special index plates can be supplied to provide any number of divisions from 2 to 54. Turrets are graduated in degrees for use in setting odd spacing or for checking.

The chuck, which is special, is designed as a combination faceplate and chuck. Self-centering with reversible top jaws, the chuck includes a steel body which is said to withstand the roughest usage. A through hole allows for passage of work up to 4 inches in diameter and permits the use of a centering plug if necessary.

The Hartford Special 12-Inch Super-Spacer can be obtained with several attachments, including a standard drilling attachment and a base for horizontal axis mounting.

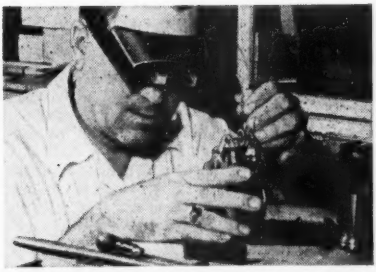


Hartford Special 12-Inch Super-Spacer

Cutter Driving Device Allows for Presetting of Tools

A cutter driving device which is said to allow for the presetting of many types

People work better when they SEE BETTER



In the General Electric Plant
Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER
SPEEDS PRODUCTION
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.
Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.
Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

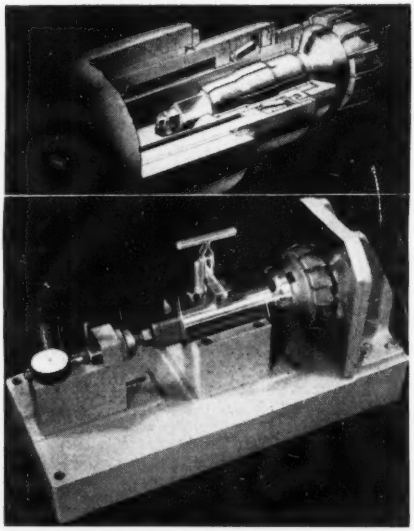
Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave., Dept. P, New York 17, N. Y.

of tools has been announced by The Cross Co., Detroit 7, Mich. Known as the Cross-Drive, the device includes a spindle drive which holds the cutter rigidly and precisely and is claimed to permit cutters to be changed in less than a minute. The worn cutter is removed by simply sliding t out of the spindle after loosening a large lock nut. A new preset cutter is then inserted.

Lost time is said to be eliminated with preset cutters since adjustments are made while the machine is running. There is no need for trial cuts in the machine since the cutter is preset in a fixture (as shown in the accompanying illustration) to a dial indicator reading within 0.0005 inch. A master length gage is supplied with the fixture to establish the limits on the indicator. A true running tool is claimed to be assured since the long straight shank of the Cross-Drive is gripped firmly by a four-point collet. A large square at the end of the shank affords a positive drive, and an adjusting screw accommodates the thrust solidly against the bottom of the hole in the spindle.

The Cross-Drive is adaptable to a variety of cutters. Shank sizes have been standardized in diameters of 1½ to 2½ inches.



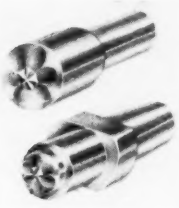
(Above) Cutaway view of Cross-Drive. (Below) Cross Cutter Setting Fixture





Diamond Cutter Marks Hardened and Ground Parts of Tool Steel

A method of successfully marking (numbering, lettering, and design) hardened and ground machine tool parts and dies has been developed by H. P. Preis Engraving Machine Co., 188 Industrial Branch, Hillside, N. J. The process has evolved from adapting a diamond cutter to use in engraving, routing, electric marking, and acid etching machines. This cutter is made with a diamond faceted to a sharp point in the manner shown in the accompanying illustration. With this sharp point and the faceted edges, the high speed rotation of the cutter in the engraving machine spindle is said to produce a clear mark



Panto Diamond Cutters

to a depth of up to 0.005 inch, depending upon the material and the degree of hardness.

The Panto Diamond Cutter is furnished in straight shank and tapered shank styles for use in any engraving or routing machine adaptable to a cutter with these types of shanks.

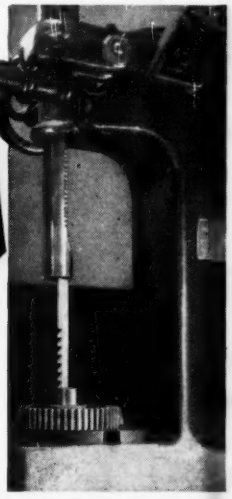
"No-Mar" Toggle Clamp

Designed especially for use on smooth and polished surfaces, the Kelly "No-Mar" Toggle Clamp illustrated herewith has been added to the line of deep throat fast grip toggle clamps marketed by R. J. Kelly Mfg. Co., P. O. Box 61, Broadway Station, Newport, R. I. Finished with cadmium plating, the clamp features fast adjustment and quick one-hand release. The design includes



Kelly "No-Mar" Toggle Clamp

CUT KEYWAYS THIS WAY



You can broach any standard width from 1/4" to 1" in any bore from 1/4" to 3" *by hand* IN ONE MINUTE for as little as *a penny a keyway* with a

Minute Man® KEYWAY BROACH KIT



CLIP THIS COUPON for specifications and prices on Kits, Broaches, Bushings and Production Type Guideless Broaches

The du MONT CORPORATION, Greenfield, Mass.

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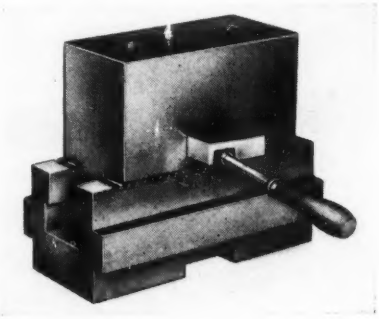
City..... *Zone*..... *State*.....

large rectangular gripping pads to prevent scratching or marring of the work being clamped, and a ½-inch diameter removable spindle which is undercut on the knurled end. The throat size of the clamp is 4 x 2½ inches.

Adjusting Device Designed for Chucks Having Serrated Type Jaws

Precision adjustment of American Standard chucks having serrated type jaws is said to be possible through use of the Whiton Micro "Jaw-Set" available from The Whiton Machine Co., New London, Conn. The device features a single adjusting screw which controls radial movement of the top jaw in such manner as to provide full tooth adjustment in either direction. This arrangement is also said to eliminate blind spots within the entire radial adjustment provided by the step-along feature of the American Standard serrated type chuck jaw.

Another advantage claimed for the device is its ability to permit precision adjustment of individual top jaws without the time-consuming process of unlocking and locking individual operating screws or set screws. Moreover, existing top jaw equipment of other type chucks can, in most instances, be readily machined to fit American Standard serrated chucks



Whiton Micro "Jaw-Set"

in combination with the Micro Jaw-Set.

The Whiton Micro Jaw-Set is available for all American Standard chucks having serrated jaws in sizes ranging from 15 through 36 inches in diameter. It can also be incorporated as optional equipment in Whiton air-operated chucks in sizes ranging from 8 through 36 inches.

NEW "MITI-MITE" NO. 500 PORTABLE DE-MAGNETIZER

The Foolproof Device Industry Has Been Waiting For

Indispensable device wherever magnetism is a problem. Completely de-magnetizes tools, parts, pieces, etc. by merely sliding over surface of item. Every shop needs this truly important device.

Single pole momentary action switch, normally open.

Base of non-breakable molded plastic 1¼" x 4"

6 ft. oil resistant cord.

Operates by pressing switch with finger. Releasing pressure shuts off unit.

Socket for plugging into any 110 AC outlet.

No. 100	Magnetic Base Holder for smaller test indicators.	$7.50
No. 120	Combination Test Indicator magnetic base holder and double lens 4X Magnifier.	$12.00
No. 150	Duplex Magnetic Base Holder for all dial indicators up to 3" dia.	$15.50
No. 200	Magnetic Base Handi-Lite complete with 25 and 40 watt bulbs.	$8.50
No. 250	Duplex Magnetic Base Lighting Unit. Holds up to 100 Watt Standard Bulb.	$18.50

OTHER "MITI-MITE" UNITS

Also Manufacturers of Enco Lathe Turrets

PRICE $10.50 Complete

ENCO MANUFACTURING COMPANY, Dept. 152
4524 W. Fullerton Ave., CHICAGO 39, ILL.

Order from your mill supply dealer or send order with name of your mill supply dealer

SEND FOR BULLETIN 604

Punch Press Tilts 25 Degrees

Designated as the Whitney-Jensen No. 127, a small powerful open back inclinable punch press which can be tilted to a maximum of 25 degrees has been announced by Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill. The flywheel of the press is located at the rear, thus providing for maximum operator safety, as well as ample room when feeding stock.

Rated at 275 strokes per minute, the press has a capacity of 5 tons and is equipped with a positive non-repeat clutch which, if desired, can be released for automatic feed. The throat depth is 6 inches; height of throat is 7 inches; and length of stroke is 1 inch with a stroke adjustment of 1¼ inches. The machine is designed to accommodate all standard Whitney-Jensen dies, the die space being 5¾ inches with the stroke down and adjustment up. The press frame is of all-welded steel construction with steel housing skirt included. The press, in the floor model, measures 59 inches high x 22 inches wide at the base x 28 inches deep.

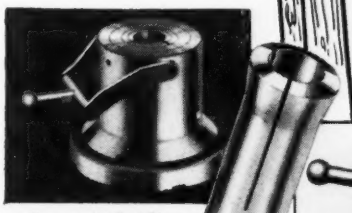


Whitney - Jensen No. 127 Punch Press

Cylindrical Parts Marking Machine Includes Air Feed and Ejector

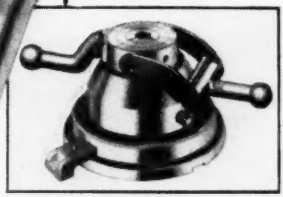
Designated as the Model No. 9AMA, a combination motor-driven air-feed marking machine announced by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J., is intended for the marking of cylindrical parts such as shells, cartridges, drills, pins, shafts, tubular parts, and so on. The parts can be brought to the machine by conveyor or by other means and rolled into feeding position down a gravity chute. At each stroke of the machine, an automatic air valve re-

ZAGAR COLLETS, HOLDING AND INDEX FIXTURES *Really* HOLD!

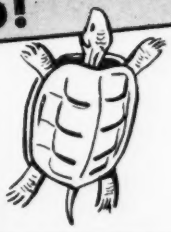


Zagar 2" holding fixture

Zagar 5-C pull type collet



Zagar 1" indexing fixture



At any age Zagar collet, holding and indexing fixtures "keep their grip". Adopt this sure, economical way to hold your work in simple or intricate machining operations. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks.

Ask for Engineering Manual S-5.



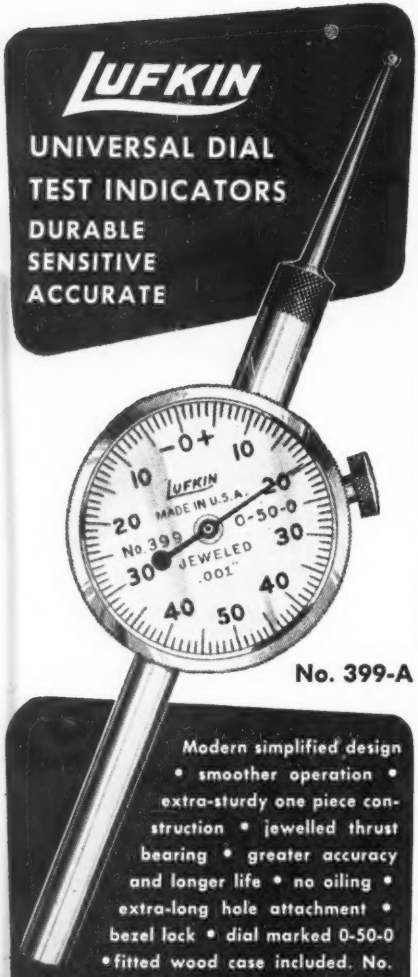
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24000 LAKELAND BLVD. • CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

LUFKIN

UNIVERSAL DIAL
TEST INDICATORS
DURABLE
SENSITIVE
ACCURATE



No. 399-A

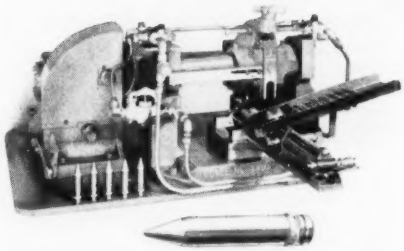
Modern simplified design • smoother operation • extra-sturdy one piece construction • jewelled thrust bearing • greater accuracy and longer life • no oiling • extra-long hole attachment • bezel lock • dial marked 0-50-0 • fitted wood case included. No. 299A as above but has dial marked 0-100, and comes without bezel lock.

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THE LUFKIN RULE CO., SAGINAW, MICH.
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Barrie, Ontario

175-A



Acromark Model No. 9AMA Marking Machine

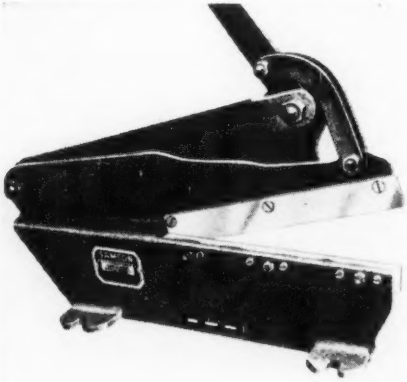
leases a plunger that pushes the part into exact marking position. Immediately succeeding the marking, another part is pushed to position, automatically ejecting the one that has just been marked.

The machine has an overall size of approximately 36 inches left to right x 24 inches deep x 16 inches high. The drive is a gear-reduction motor furnished for 110 to 220-volt, 60-cycle a.c. connection, and the air pressure can be taken from a standard, medium to high pressure line. The machine utilizes an interchangeable die holder in which can be inserted steel marking type or dies with any desired lettering, numbering, or design. The part is rotated in a set of ball-bearing cradle rolls, and the die passes over the part to impress the mark.

Hand Lever Slitting Shear Has 14-Inch Blade Length

Marketed by Julius Blum & Co., Inc., 540A W. 22nd St., New York 11, N. Y., the Samson No. 40 Hand Lever Slitting

Samson No. 40 Hand Lever Slitting Shear



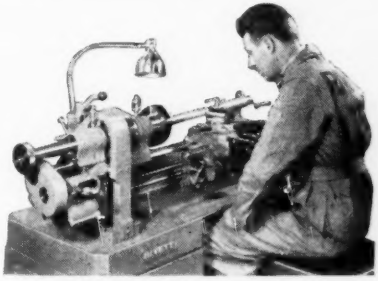
Shear illustrated herewith has a blade length of 14 inches, thereby making it suitable for cutting wide strips of light gauge metal in one stroke of the lever. The offset frame permits slitting sheets of any length or width.

The shear has a capacity for ⅛-inch mild steel sheet or plate and weighs 140 lb. net. The frame is of steel plate construction that is claimed to be unbreakable. The shear is available in two models; namely, Model 40-S having straight blades (as shown) and Model 40-C having special blades for shearing corrugated sheets up to No. 16 gauge.

Instrument Lathe Features Extreme Accuracy

An instrument lathe featuring extreme accuracy is now being offered by Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Mass. Outstanding for its sensitivity, this 8½-inch swing lathe is said to be guaranteed to turn or bore within 0.001 inch in 6 inches work held in a collet or between centers.

A back-geared screw cutting engine lathe, the Model 608 is recommended for a variety of work. Attachments are available for milling, spiral cutting, slotting, relieving, taper turning, radius turning, grinding and forming. According to the manufacturer, performance within the guaranteed limits is attained and safeguarded by a three-point bed mounting; double-bevel alignment for head and tailstock; carriage bearing of 76 square inches on the bedways; separate lead screw for thread cutting; double taper, self-aligning spindle bearings; and heat-treated precision ground feed screw.



Rivett Model 608 Instrument Lathe

AIR-MITE

AIR ARBOR PRESSES

(AIR OR SPRING RETURN)

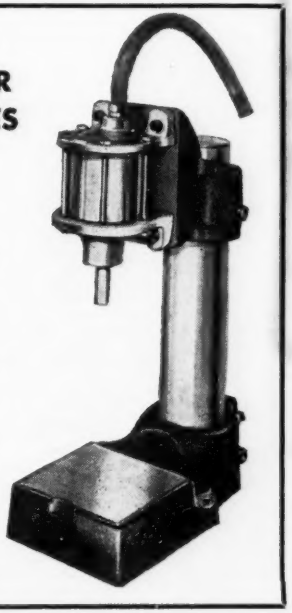
Completely Flexible

AIR-MITE now supplies solid steel upright columns in any lengths required to give you these important flexibility features:

1. Normal ram clearance of 0" to 6" may be increased to any clearance required for special application.
2. Supplementary or replacement cylinders with any ram stroke required are available for quick, easy mounting on same brackets.
3. Rapid socket wrench adjustment cylinder bracket swivels for perfect alignment with work.

Presses, are available in ¼, ½, ¾ and 1 ton capacities—for staking, riveting, marking, punching and similar operations.

Write for complete catalog of Air-Arbor Presses and single and double acting Air Cylinders.

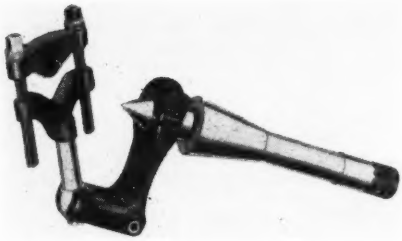


AIR-MITE

4417-H West Carroll Ave.
CHICAGO 24, ILLINOIS

Combination Dog and Driver

A combination milling machine dog and driver which is claimed to consistently provide accurate spacing on taper work and spiral cutting has been added to the line of "Red-E" products manufactured by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn. The design of the device includes a hardened ball (sliding on a hardened stud between ground jaws) which acts as a universal ball and socket joint. With this arrangement, cramping or springing of the work is eliminated since the movable parts of the jaw provide contact only—without torsional strain.



"Red-E" Combination Milling Machine Dog and Driver

The Red-E Combination Dog and Driver is supplied in two styles; namely, Style No. 130 with ¼ to 2-inch capacity and Style No. 132 with ¾ to 2⅜-inch capacity. The device can be furnished complete with either a No. 10 or No. 11 B&S taper. It is also available with a No. 40 standard milling machine taper or any other special taper required.

Separating Device Removes Water and Oil from Air Lines

For removing water and oil from the compressed air lines of air tools and controls, Strong, Carlisle & Hammond Co., Cleveland 13, Ohio, has available a combination separator and trap mechanism which, when installed on air-using equipment, separates water and oil from the air at the point of use.

Compressed air used in operating air tools and controls carries suspended moisture taken from the air during the process of compression. As the air is forced through the lines, it drops in temperature, thereby causing this moisture to condense into water. The SC&H Combination Separator and Trap Mechanism is designed to remove the moisture (and oil) from the air and drain it off just before it reaches the air-using equipment.

THE MAC REVOLVING STOP



A new, economical ball bearing revolving stop for Brown & Sharpe Automatic Screw Machines. Eliminates mutilating stock and bar ends. Try one and be convinced. Made in three sizes:

1" OD. — ¾" OD. — ⅝" OD.

THE WHITFIELD MFG. CO.

402 Oakland Ave. Washington C. H., Ohio



CLEAN, DRY AIR
WITH
MURPHY SEPARATORS AND AFTERCOOLERS

Murphy type A & B separators take out and eject all moisture automatically. Also many styles of Murphy aftercoolers for air as low as 30 CFFAPM up to 15,000 CFFAPM.

Write for catalog.

Jas. A. Murphy & Co., Inc.
1421 High St., Hamilton, O.

THE CRALEY OFFSET BORING HEADS



- Note depth of bearing.
- Tool carrying block most accurately fitted of any boring head made.
- Large graduated dial screw—easily read calibrations.
- Note minimized overhang.
- Tension screws on opposite sides and ends of block—all cutting strain thrown against solid metal.
- Nine sizes.
- 20 years of Craley experience specializing in boring heads.



Write for illustrated Catalog MS.

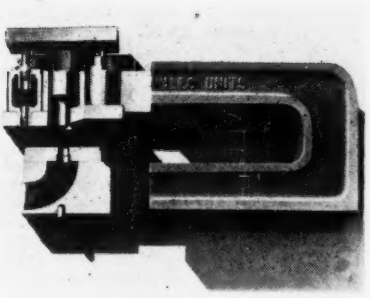
C. C. CRALEY MFG. CO.

SHILLINGTON PENNSYLVANIA

Unit Punches Holes in ¾-Inch Mild Steel

The Wales Type "HS" Hydra-Strip Hole Punching Unit for punching holes in mild steel up to ¾-inch thick has been announced by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y. The heart of the unit is the Wales Hydra-Spring which, by utilizing the compressibility of special fluids, is claimed to provide many times more stripping pressure than mechanical springs of the same volume. Hydra-Spring loads may be changed by a simple adjustment to increase or decrease the volume of the fluid.

The Wales Type HS Hole Punching Unit is independent and self-contained. All component parts are built into a holder which is said to keep the round or shaped punches and dies in accurate alignment for the life of the unit. The design of the unit eliminates the need for attaching same to the press ram; the only function of the ram is to depress the punch. The unit may be readily set up in multiples on templates or T-slotted plates in stamping presses and on rails, strip templates, or T-slotted plates in press brakes. The interchangeable use of the same group of units permits setups of unlimited hole punching patterns and fabricating parts the same day a hole punching design is released for production.



Cutaway view of Wales Type "HS" Hydra-Strip Hole Punching Unit showing two Wales Hydra-Springs (one on each side of the punch). The Hydra-Spring at the left of the punch is a cross-section view.

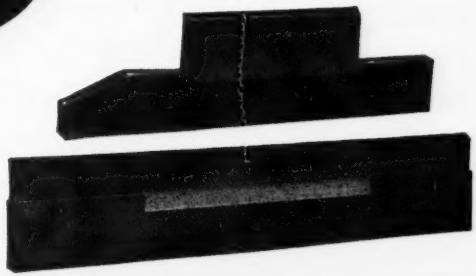
Profile Tracing Attachment Performs Variety of Machining Jobs

U. S. Tool & Engineering Co., 3219 San Fernando Blvd., Burbank, Calif., is now

WILLEY'S
TUNGSTEN CARBIDE
TOOLS

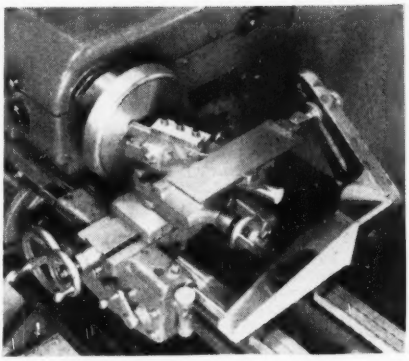
CARBIDE TIPPED
Work Support Blades
for CENTERLESS GRINDERS

Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints. We retip and regrind. Let us salvage your worn blades.



WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

manufacturing the "Pro-Tracer," a profile tracing lathe attachment which can be adapted to a wide variety of machining operations, including facing, taper turning, small and large radii and straight turning, shoulder turning (either internally or externally), internal, external, and taper threading, boring, and various other operations. Available in models for all engine lathe models up to 20 inches and turret lathe models up to 3, 4, and 5, the attachment can be quickly installed without any alterations of the lathe. Full use of the lathe cross feed and compound is permitted at all times. The tool bit is adjustable vertically and may be locked against any movement.

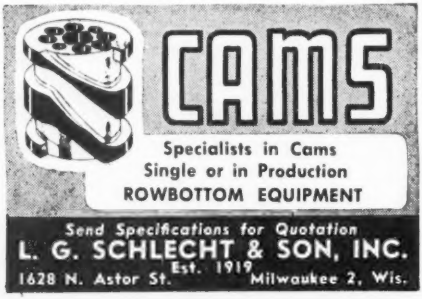


"Pro-Tracer" Profile Tracing Attachment installed on a lathe

The toolslide of the Pro-Tracer is mounted on preloaded ball bearings to eliminate all play and consequent backlash. The template is pivotally attached to the lathe bed and supported horizontally and vertically by the Pro-Tracer head.

High Speed and Carbon Twist Drills

Butterfield Division, Union Twist Drill Co., Derby Line, Vt., has announced the addition of a complete line of high speed and carbon twist drills to its present line of taps, dies, and reamers. In addition to the standard styles and types of twist drills, the Butterfield line includes drills especially styled for newer materials such as magnesium, aluminum, plastics, and so on, as well as various types of drills for modern operations, such as aircraft extension, heavy duty, and automotive series drills. A 96-page catalog complete with illustrations and up-to-date drilling recommendations is available on request.







All-Purpose Lamp Attaches Instantly to Any Steel Surface

Known as the "Magnetik," an all-purpose utility lamp with Alnico magnet base which is said to attach instantly to any steel surface is now being marketed by Acme-Lite Mfg. Co., 401 N. Wood St., Chicago 22, Ill. The lamp, which has a diameter of 4¼ inches and a depth of 5 inches, swivels to any angle in its own magnetic socket. Attractively finished in either sea-green Hammerloid with white enameled interior or in brushed aluminum with polished interior, the lamp includes high quality approved electrical fittings featuring a Turn-Knob on-off switch.

The Acme-Lite Magnetik Lamp can be used on



Acme-Lite "Magnetik" All-Purpose Utility Lamp

lathes, millers, shapers, drill presses, grinders, saws, punch presses, riveters, pneumatic tools, spray booths, infra-red drying ovens, shop benches, conveyors, steel shelving in stockrooms, and on numerous other pieces of equipment and areas.

Instant Action Wheel Dresser

In order to facilitate the dressing of grinding wheels, Magic City Machine & Tool Co., 2128 S. Walnut St., Muncie, Ind., has placed on the market an easily adjustable diamond holder. This wheel dresser is said to provide for instant raising or lowering of the diamond dressing point, thus eliminating the need for lower-



Magic Instant Action Wheel Dresser

STANDARDIZE WITH OHIO



Illustration above shows how an Ohio Gear Special Speed Reducer acts as the "Old Hen" in operating Chick Master's huge 78,000 egg incubator unit. This reducer turns the eggs, just as the hen would, in hatching the chicks. Pictured also are four units of a large Hatchery, producing 312,000 chicks every 21 days. Each unit is operated by an Ohio Gear Special Speed Reducer.

• Chick Master Incubator Co., one of the world's foremost manufacturers of commercial incubators is putting a lot of faith in Ohio Gear's product and engineering ability which in turn insures their incubators continuous performance from coast to coast — a grand tribute to a speed reducer.

Perhaps your product could use Ohio Gear's experience in gears and reducers whether stock or special. It's good insurance. Call your nearest distributor or write direct.

ESTABLISHED 1915
THE OHIO GEAR COMPANY
1303 EAST 179TH STREET • CLEVELAND 10, OHIO

OHIO GEARS

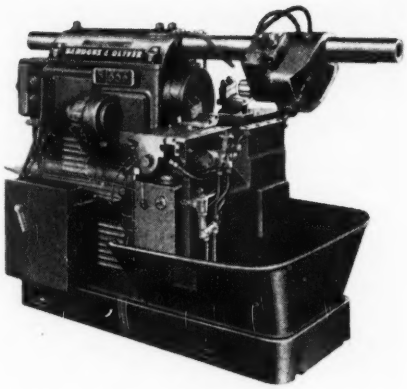
ing or raising the wheel when dressing it.

The Magic Wheel Dresser may be used to dress both sides of the grinding wheels as well as the face of wheels on surface grinders, cutter grinders, and grinding machines. A serrated, positive locking surface between the solid base and the diamond holding arm provides for positioning the arm at the desired elevation up to 16 inches maximum height. A well proportioned, aluminum locking knob assures positive locking of the arm in all positions.

Cut-Off Lathe Offered in 3 and 4-Inch Capacities

Bardons & Oliver, Inc., 1137 W. 9th St., Cleveland 13, Ohio, has announced an automatic cut-off lathe which is available in two models; namely, No. 33 with a capacity to 3-inch diameter (2½-inch pipe) and No. 34 with 4-inch diameter (3½-inch pipe) capacity. Electric remote control permits automatic cutoff to any length. Spindle speeds range from 85 to 100 r.p.m. with four quick changes. A pair of reversible pick-off gears makes available a total of eight speed changes.

Independent hydraulic systems are used for the cut-off slides and collet chuck operations. Since no cams are employed, a complete change in setup from one size and length of work to another can be made in less than one-half hour, it is claimed. A newly designed stock feed table which operates automatically is now available for use with the lathe.

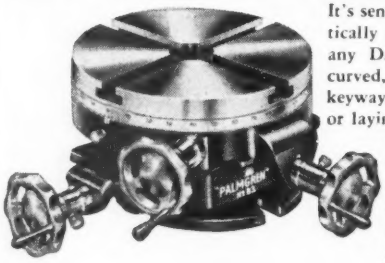


Bardons & Oliver Automatic Cut-Off Lathe

PALMGREN

ROTARY TABLE

The Only Table Having ROTARY FEED Combined with DUAL CROSS FEEDS



It's sensational—in price, construction, performance. Practically a universal milling machine. Designed for use on any Drill Press or Milling machine. Rout straight or curved, rabbet, drill, sand or mortise. Mill slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, index or laying out work.

Precision made, it permits fine work to close tolerances. Rotary feed is calibrated in degrees; Cross Feed in thousandths. Cross slides and feeds are 2⅛" each side of center—4¼" overall. Adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 Lock screws. Order NOW!

No. 83—8" Table $54.50

No. 82—Without Rotary Feed $43.75

Write for Circular No. 302

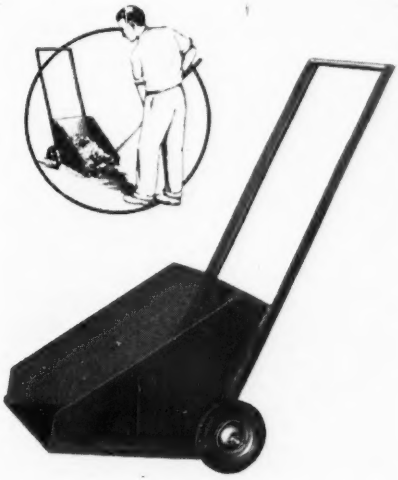
CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of PALMGREN PRODUCTS *for over 34 years*

8399 South Chicago Ave., CHICAGO 17, ILL.

Industrial Dust Pan Is Constructed to Withstand Rough Usage

Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich., has announced the industrial dust pan illustrated herewith which permits debris on the plant floor to be readily collected by simply pushing the pan up to the debris and sweeping it into the unit. Although light in weight (45 lb.), the unit is of all-welded construction so as to withstand rough usage. The metal pan measures 18 x 18 x 18 inches and is made of 16 gauge sheet steel. The frame is 1 x 1½ x ⅛-inch angle iron with handle of 1-inch tubing. The unit has an overall height of 48 inches and is equipped with two 8-inch rubber-tired ball-bearing wheels.



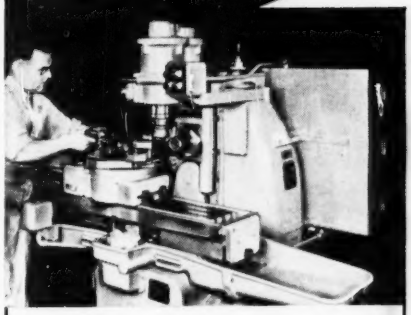
Palmer-Shile Industrial Dust Pan

Engraver Is Designed for Panels of Any Dimensions

A portable industrial engraving machine designed for work on panels of any dimensions has been announced by New Hermes Inc., 13-19 University Pl., New York 3, N. Y. The machine features a detachable chassis which, when removed from the base, may be easily placed directly on the work surface for precision engraving.

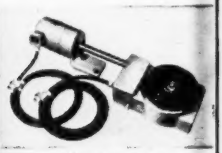
"Tracer-guided," thus allowing it to be operated by unskilled labor, the new

Milling 150 Parts Per Hour With a SUNDSTRAND AUTOMATIC INDEX BASE



Here's another good example of the production available with a Sundstrand Automatic Index Base. Both the top and one side of the cylinders are milled simultaneously. Two fixtures are mounted on the Index Base. Thus loading can be done while milling at opposite station.

Accurate Spacing, Powerful Clamping Insures Accuracy



Sundstrand Automatic Index Base

Designed so there is no strain against index plunger during cut — accuracy of index not affected by heavy cuts.

Get Complete Data **FREE**

Ask for bulletin 520.



SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

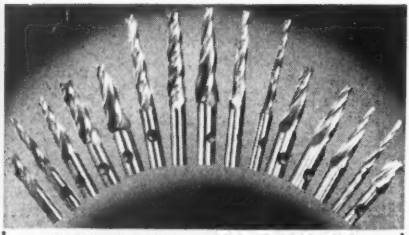


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Dial Test Indicator
$23.50

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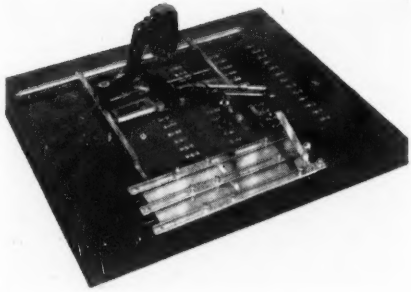
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For Faster, Smoother Cutting—Less Breakage.
Reduced Spindle Vibration.
Long, Durable Performance.

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3802 Buchanan S.W., Grand Rapids 8, Mich.



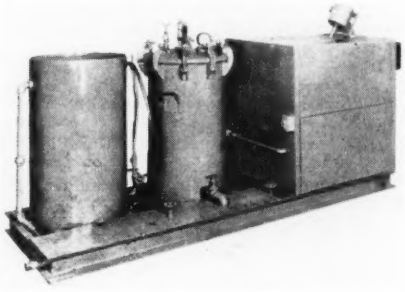
New Hermes Portable Engravograph

model Engravograph is said to be capable of reproducing 15 different sizes of letters and numbers from one master alphabet. Another outstanding feature claimed for the machine is its ability to perform multi-line engraving with only one setup. Special adjustable copy holding slides allow for three or more lines of engraving in a single setup.

Impregnating Equipment Eliminates Porous Castings

Designated as the Model M-30 Mogullizer, a machine for the production line impregnating of ferrous and non-ferrous leaking and weeping castings has been announced by Metallizing Company of America, 3520 W. Carrol Ave., Chicago 24, Ill. One of four available models, the machine, which has a capacity of 4½ cubic feet, is a complete unit comprising a vacuum pump; sealing, rinsing and supply tanks; heating element and power supply; and all necessary fittings and controls. The sealing (vacuum) tank measures 20 x 30 inches, and the entire

Model M-30 Mogullizer



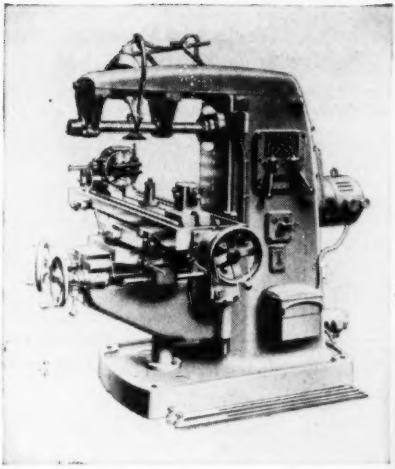
machine, weighing 850 lb., requires 36 x 100 inches of floor space.

Castings to be impregnated are placed in the sealing tank of the unit where they are first subjected to a 29½-inch vacuum for 20 minutes, removing all air and moisture from their inner walls. Next, an impregnating solution is introduced into the vacuum tank, covering the castings, after which air at 100 lb. pressure is applied to the castings for another 20 minutes, forcing the solution into the casting walls from all directions. When the remaining solution is withdrawn to its tank, the castings are removed and rinsed in plain water.

Miller Is Available in Vertical and Universal Models

Morey Machinery Co., Inc., 406 Broome St., New York 13, N. Y., is now distributing the Jaspar Milling Machine which is made in a range of models, both vertical and universal, in Nos. 2 and 3 sizes. In most instances, the universal type is designed to incorporate climb-milling attachments.

The machine is heavily and sturdily built so that the table, when used for production manufacturing, can withstand the maximum speeds of tungsten carbide cutters. The unit is equipped with a main drive motor for the spindle and a separate motor for actuating the feeds of the table.

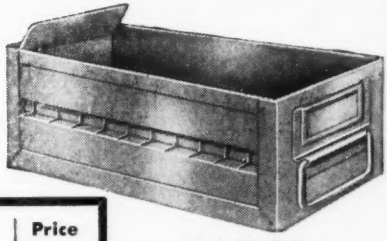


Jaspar Milling Machine

ADJUSTABLE COMPARTMENT DRAWER

—

IMMEDIATE SHIPMENT



Product Number	Width	Length	Height	Price Green
95BHL	5½"	11¾"	4⅝"	$1.20
96BHL	5½"	17¾"	4⅝"	$1.38
97BHL	8¼"	11¾"	4⅝"	$1.31
98BHL	8¼"	17¾"	4⅝"	$1.49

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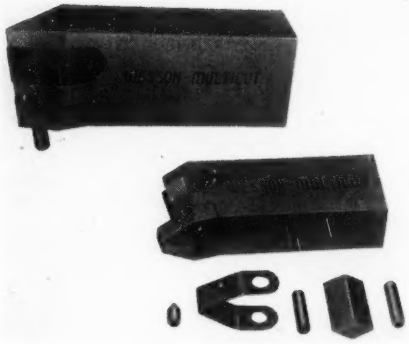
PHONE - WIRE - WRITE
BAldwin 9-1805

BAY METAL PRODUCTS

3015 N. 16TH STREET • PHILADELPHIA 32, PA.

Toolholder Designed Especially for Follower or Tracer Lathes

Designated as the DTRL "Multicut," a toolholder designed especially for use on follower or tracer lathes has been announced by Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Detroit 20, Mich. The holder utilizes a 55-degree diamond-shaped solid Wessonmetal insert and has the unique feature of being able to cut in either direction. Ample clearance is provided on both sides of the diamond insert to permit this multicutting action.



Wesson DTRL "Multicut" Toolholder

The Wessonmetal carbide insert is held by a tempered steel band, which is readily replaceable when required. The tool provides a maximum cutting edge clearance of 35 degrees in straight shoulder turning, has two cutting edges, and can be used to cut from right to left or left to right. The insert can be turned end for end to provide the user two new cutting edges, thus making a total of four cutting edges for each insert.

The Wesson DTRL Multicut Toolholder can be used on either side of the work (or simultaneously in pairs on both sides of the work) and can be locked in position rightside up or upside down. When used in the upright position, the insert, when adjusted flush with the faced-off top surface, is centered automatically. Locking, adjusting, and changing of inserts are accomplished by adjusting a screw on top of the holder while the latter is in position. This arrangement permits the use of several tools side by side when required.



SOMERSET Radius Dresser SAVES TIME

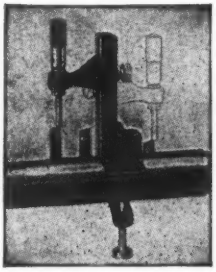
Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.

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SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.

SAVE TIME

With Bartelt Gages



• Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step — eliminate cut-and-try-methods. Model B, with reversible slide, shown. *Write for literature describing all models.*

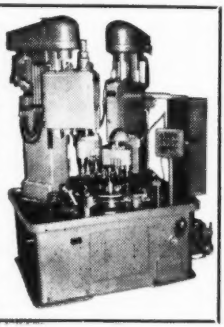
BARTELT ENGINEERING CO.
1216 PARTRIDGE AVE.
BELOIT • WISCONSIN

KAUFMAN TAPPING MACHINES

Every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features.

Write for complete information

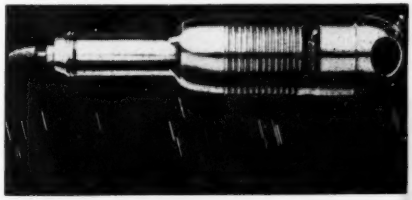
KAUFMAN MFG. CO.
Manitowoc, Wisconsin



Grinder-Miller Is Built for Precision High-Speed Applications

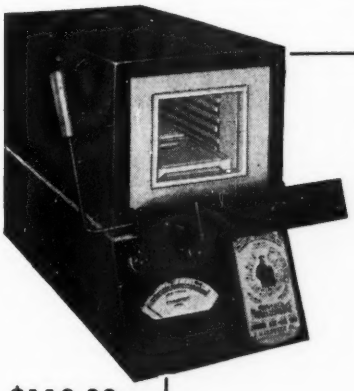
Product of Precise Products Co., 1345 Clark St., Racine, Wis., the Precise Super 40 Grinder-Miller illustrated herewith is described as a multi-purpose electrically-powered unit built for precision high-speed applications when set up in Precise machine tool mounts on standard machine tools or when used as a portable hand tool with or without the attachable "Coolflex" flexible shaft. Equipped with an extremely accurate quill and collet chuck, the unit is designed to operate at controllable speeds from 15,000 to 45,000 revolutions per minute.

With its powerful ¼ h.p. motor, the tool, it is claimed, can be adapted to 'round-the-clock grinding, milling, and finishing of small parts in production, as well as to all types of work in the toolroom. The range of such applications includes internal, external, cylindrical, and form grinding; precision milling with high speed steel or tungsten carbide midget mills and saws; sawing, slotting, small diameter drilling, finishing, polishing, and micro-finishing of hardened steel surfaces with diamond compounds. According to the manufacturer, soft materials such as wood, Masonite, rubber, and plastics can be worked to fine finishes as well as glass, Fiberglass, and all metals, including the hardest alloy steels. Work can be finished to tolerances within 0.0001 inch, it is claimed.



Precise Super 40 Grinder-Miller

For close tool or die grinding and finishing, or for hand work on small parts, the Coolflex flexible shaft (optional) is available for quick, easy attachment. This precision-built accessory is said to extend the full power and speeds of the Precise Super 40 to a small 10-oz. air-cooled handpiece.



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MODEL 22 DeLuxe FURNACE

Accurately Controlled

Here's a compact, durable furnace that is ideal for tool and die shops and small laboratories. Any desired temperature within the range of 350° to 1800° F. is controlled by an accurate, built-in Huppert temperature controller. All-steel construction—multi-insulation—sturdy Kanthal elements—counterweighted doors—two removable porcelain trays. Current consumption is 1600 Watts — 110 Volts A.C. I.D. 4½" x 3⅝" x 9".

$110.00
Complete with Pyrometer

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Same Model—All Stainless Steel Construction

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Model No. 5 DL	4¾" x 3¾" x 9"	300°-1900° F.	1750	$172.00
Model No. 9 DL	6" x 6" x 6"	300°-1900° F.	2000	$200.00
Model No. 10 DL	8" x 4" x 6"	300°-1900° F.	2000	$215.00

(Also available in stainless steel at slight additional cost)

K. H. HUPPERT CO.

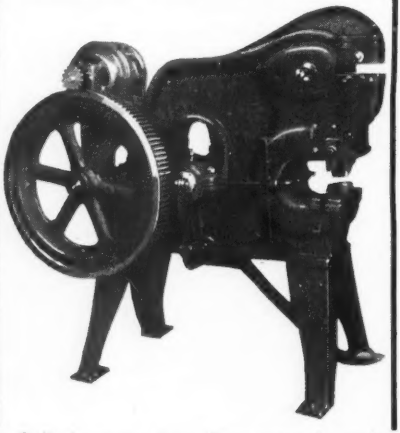
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- *Profitable Performance*
- *Long Service at Low Cost*



• Built in seven sizes, these rugged punches and shears are equipped with punching attachment, adjustable stripper, back gauge and shear blades for flat and round bars.
Quick acting four jaw clutch provides for a clutch engagement at every quarter turn of the main gear . . . means faster operation. Can be arranged for notching and coping angles. Will handle many other special jobs most efficiently at low initial and operating cost.

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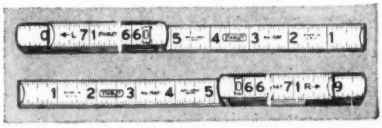
HENDLEY & WHITTEMORE CO.

110 Blackhawk Blvd. Beloit, Wis.

Builders of Punches, Shears and Bending Rolls since 1900

Rule Affords Two-Way Reading for Quick and Easy Measuring

Designated as the "Read-Rite" No. 156F, a zig-zag rule with two-way read-



Stanley "Read-Rite" No. 156F Rule

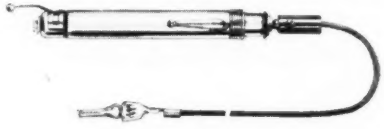
ing feature for quick and easy measuring is now being offered by Stanley Tools, New Britain, Conn. The rule is designed to read from left to right, or right to left, by merely rolling it over in a natural manner. When opened, the graduations lie close to the work for easy reading.

Branded in red and provided with green ends, the roll features long-wearing nickel silver joints with ball-socket action; a new plastic finish that protects graduations over a long period of use; and large easy-to-read numbers.

Pocket-Size Tester Determines Continuity of Circuits

Ideal Industries, Inc., 1031 Park Ave., Sycamore, Ill., is now manufacturing a pocket-size continuity tester which is designed to determine the continuity of circuits and identify wires between terminals or in multi-wire cable, as in switchboards and control panels. According to the manufacturer, the tester permits the testing of circuits without the need of live wire connections since it provides its own power from Pen-Lite batteries.

The Ideal Continuity Tester, it is claimed, may be used in noisy areas since it utilizes a signal-light indicator which illuminates at the point of contact. Moreover, it requires only one hand for operation, leaving the other hand free to hold



Ideal Continuity Tester

circuit diagrams or blueprints. The tester is furnished complete with a 4-foot cord and alligator clip.

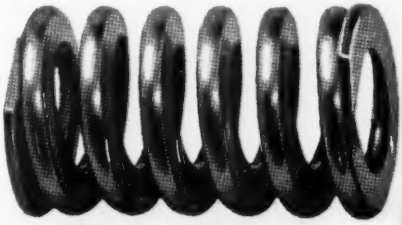
Coolant Provides for Clean, Cool Cutting

Known as "Trim," a coolant for use in performing a wide variety of grinding and machining operations on metal products is now being marketed by Master Chemical Corp., 538 Erie St., Toledo 2, Ohio. According to the manufacturer, the coolant provides for unusually long cutting tool and grinding wheel life; fast machining and grinding; rapid heat removal; and the production of high quality, uniform finishes. Moreover, the coolant, it is claimed, prevents the rusting of cast iron and steel, has a pleasant odor, does not sour, and does not affect the operator's hands.

Trim is said to mix easily with hot or cold water and work well in either hard or soft water. The coolant may be readily diluted for efficient grinding, milling, turning, drilling, broaching, threading, and tapping of steel and cast iron.

High-Pressure Spring for Die Applications

The Producto Machine Co., 910 Housatonic Ave., Bridgeport 1, Conn., has announced the availability of a high-pressure spring designed for die applications and general machinery use. The spring is made of drawn, high carbon, oval wire which permits a deflection of about 30 per cent where maximum load rate and normal movement are required.



Producto High-Pressure Spring

Designed to work in hole diameters from $\frac{3}{4}$ to 2 inches and over rods from $\frac{31}{32}$ to $1\frac{3}{8}$ inch, the spring is cut to exact lengths from $1\frac{1}{2}$ to 12 inches with ends closed and ground square, and is claimed to withstand maximum pressures from 400 to 2,000 pounds.

SAMSON
Offset
BORING CHUCKS

THESE JOB-PROVEN FEATURES WILL SAVE YOU TIME AND MONEY

- *Quick tool change*
- *Positive dead-centering*
- *Precision offset adjustment*
- *Rugged tool support*
- *Safety round contour*

Complete Boring Chuck Accessories Available

WRITE FOR COMPLETE DETAILS



Manufacturers of
FAMOUS
LAST WORD
WHEEL
DRESSER



LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

Drill Press Speed Reducing Pulley Mounts Directly on Motor

The Pull-Gear Co., 21125 Dequindre, Hazel Park, Mich., has introduced a speed reducing pulley which is designed for easy mounting directly on the motor of a drill press, replacing the standard three-step pulley and making possible a gear reduction of 4½:1 on each of the pulley steps. With the pulley, the operator has, in effect, three intermediate speeds at his disposal, plus the three original pulley speeds, thus providing for unusual flexibility of drill press operation.

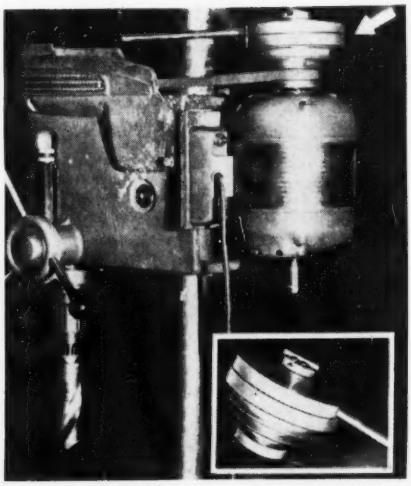


Illustration showing Pull-Gear Speed Reducing Pulley (inset) and its installation on a drill press

The Pull-Gear Speed Reducing Pulley is totally enclosed and, being made from an aluminum forging, is light and easy to handle. It is available in shaft bore sizes of ½, ⅝, and ¾ inch. Once installed, the reducer, disengaged, provides the same speeds as regularly afforded; however, with the driving pin engaged, there are three intermediate speeds at the operator's disposal, with a slow speed as low as 100 r.p.m. possible. The lock or driving pin is engaged by merely adjusting a key on top of the unit which throws into play an inner gearing ratio providing the consequent speed reduction. With the speed reducing pulley, the change from high to low speeds is said to be effected in a matter of seconds.

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅝" — in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

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SOLD THRU LEADING SUPPLY HOUSES



GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

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THE MURPHY PISTOL SPRAYER

Indispensable in Any Shop

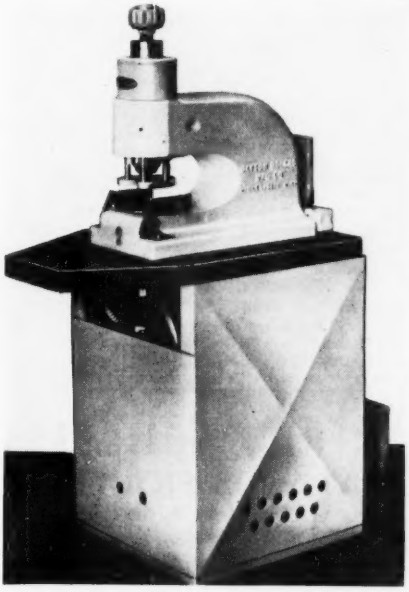


No limit to work it will do. Takes place of brush and spray can for blackening mold. Blackening is driven into pores of sand or loam by air pressures. Thus it stays on and peels the casting better. Once tried, always used. Write for catalog. We also manufacture Hamilton Spray Gun.

JAS. A. MURPHY & CO., INC.
1421 HIGH ST. HAMILTON, OHIO

Press Especially Adaptable for Piercing Holes in Large Parts

Dayton Rogers Mfg. Co., 2824 Thirteenth Ave., S., Minneapolis 7, Minn., is now marketing an automatic electric piercing press which is said to be especially adaptable for piercing holes in rather large parts, particularly where quantity requirements are limited. An outstanding advantage of the machine is the fact that it does not require any hand or foot levers to trip the ram, thus leaving the operator free to handle large parts with ease. The machine is placed into operation through two contacts on a magnetic stripper plate.



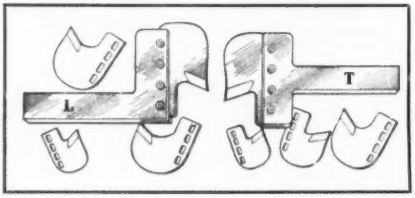
Dayton Rogers Automatic Electrical Piercing Press

The Dayton Rogers Electric Piercing Press is said to be capable of piercing holes up to ½ inch in diameter in materials up to $\frac{3}{4}$ inch thick. The ram is located in the bed of the machine, permitting the punches to be mounted above for easy location of pierced holes. The machine is designed to accommodate a standard Allied punch and die and is provided with a non-repeat mechanism. The unit is mounted on casters, thus enabling it to be readily moved around as required.



Cut-Off Tools Available in L and T-Types

A line of cut-off tools for cutting all types of metal at unusually high speeds is now being marketed by Messenger Tool Co., Pomona, Calif. The line includes straight and right offset L-type holders and straight and offset T-type holders. The L-type holders are said to be more suitable when running the machine in reverse, while the T-type holders are especially suited for operating in a forward position or catching the material from the back side.



Messenger L-Type and T-Type Cut-Off Tools

Both types of holders are designed to accommodate high speed, Vascoloy-Ramet and Tantung-tipped blades for cutting work from 0 to 13 inches in diameter. All blades are reversible and interchangeable. Outstanding features claimed for the tools include the elimination of chatter, ease of setup, unusual speed of operation, and accuracy of cut.

Reciprocating Hand Tool Designed For Constant Duty Operation

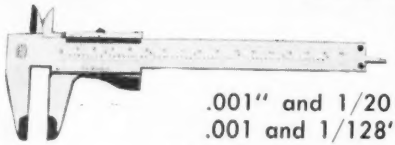
S.C.&L. Machine Co., 1123 Fourth Ave., Rockford, Ill., has announced the "Recipro-Tool," a heavy duty reciprocating hand tool which is designed for constant duty operation and can be plugged into any 110-volt 60-cycle a.c. circuit to allow for the quick and easy permanent engraving of letters, numbers, or identification marks on any material of any hardness regardless of shape, size, or surface finish. In addition to marking, the tool can be used for riveting, filing, burring, peening, and for cutting glass, gaskets, plastics, shim stock, and other materials.

The Recipro-Tool, which measures 5⅛ inches long overall and weighs 14 oz., is designed to deliver a 5¼-lb. impact and is available with a variety of hardened alloy steel bits (for materials

M·Z·B

Precision Vernier Calipers

ACCURATE • DEPENDABLE



A tool to comply with the most exacting demands. Measures inside, outside and depth.

Graduations to read:

.001" and 1/20 m/m (Cat. No. 30-64)

.001 and 1/128" (Cat. No. 30-61)

$14.00

Also 12" calipers and height gauges available.

Both models also in stainless steel at **$16.50.**

Measuring capacity 5¼".

In stock; MZB micrometers, 1" size, to read .0001".

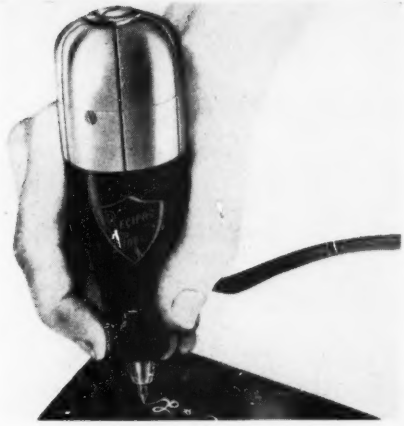
A very fine tool comparable only to the best, **$15.00.**

We are interested in representatives in various territories, regarding an agency or a dealership for MZB fine measuring tools.

For information contact:

INTER-CONTINENTAL TRADING CORP.

90 WEST STREET • NEW YORK 6, N. Y.



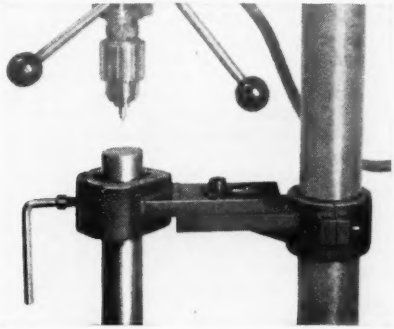
Recipro-Tool

up to Rockwell 50C) or with a diamond-tipped bit. The 7,200 power strokes per minute provided by the tool are adjustable from 0 to ⅛ inch; a positive locking device is said to accurately maintain length of stroke until reset. The low center of gravity, finger-grip close to the chuck, finger-tip switch control, and electric cord leading under the operator's hand are features which are claimed to make for easy, accurate operation. One large well lubricated bearing close to the working surface is claimed to assure minimum wear and a high degree of accuracy.

Device Speeds Work Centering on Drill Presses

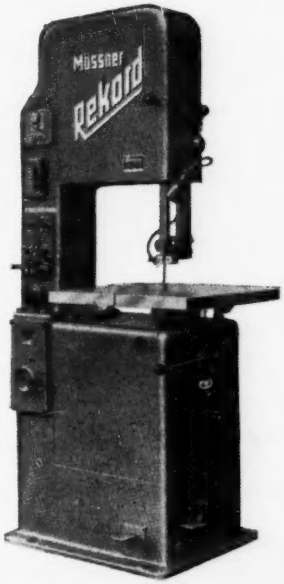
Known as the "Center-It," a drill press centering device which is designed to

"Center-It" Drill Press Centering Device



MOESSNER

COMBINATION BAND SAW AND FILING MACHINE



- Available in 14" and 20" throat capacity.
- Table sizes 20" x 23" and 24" x 27½".
- Infinitely variable speeds from 50 to 4000 feet per minute.
- Files and saws any material.
- Quick delivery, very favorable prices.

ERNEST GOTTSCHALK CO., Inc.

401 BROADWAY, NEW YORK 13, N. Y.

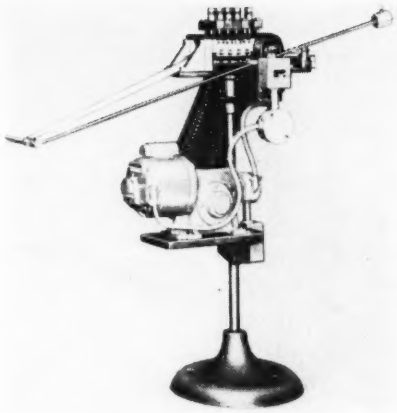
We can also offer heavy duty engine lathes from 14" to 20" swing, various types of milling machines, tool and cutter grinders, hydraulic surface grinders, hydraulic universal circular grinders. All these machines are of highest quality and made by some of Europe's most outstanding manufacturers.

speed centering operations on round, square, and hexagonal workpieces is now being marketed by Champlain Motors, Inc., 281 N. Main St., St. Albans, Vt. Said to center up to 450 pieces per hour, the device, which is available for use on various makes of drill presses, has a capacity for work up to 2 inches in diameter. Claimed to hold bars firmly, the device can be quickly set up for large or small lots and may be used to center one or both ends of the work.

Motor Drive Arrangement for Stock Straighteners

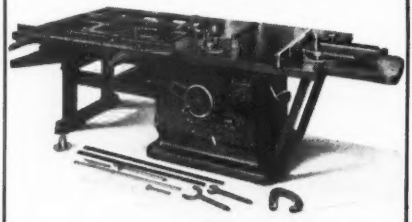
The accompanying illustration shows a new motor drive arrangement that is available on any of the standard sizes of stock straighteners marketed by Durant Tool Supply Co., 155 Orange St., Providence 3, R. I. The stock straighteners are made in a wide range of sizes and types for handling stock up to 12 inches in width and 5, 7, or 9 rolls of 1, 1¼, or 1½ inches in diameter.

For straightening round or flat wire and tubing, the improved two-way wire straighteners are recommended. These units consist of two sets of 5, 7, 9, or 11 groove rolls set at right angles to straighten the material in two planes. The rolls can be grooved for the exact diameter of the wire or tubing to be straightened or can be V-grooved, in which case the straightener can be used for a range of wire sizes. Suitable rolls can be furnished for stock or irregular cross-section. All rolls are equipped with anti-friction bearings, and each straightener roller can be individually adjusted for proper straightening action. The straighteners can be mounted on slide feeds or roll feeds to provide an automatic unit for straightening and feeding wire.



Durant Stock Straightener equipped with new motor drive arrangement

"OLIVER" No. 88
Metal Cutting Saw Table



Cuts and Mills Aluminum Rapidly

This new "Oliver" production machine cuts aluminum, brass, aluminum and brass alloys, sheet steel, etc. Made with many variations of speed and rolling table sizes to meet specific needs. Saw arbor can be tilted up to 45°.

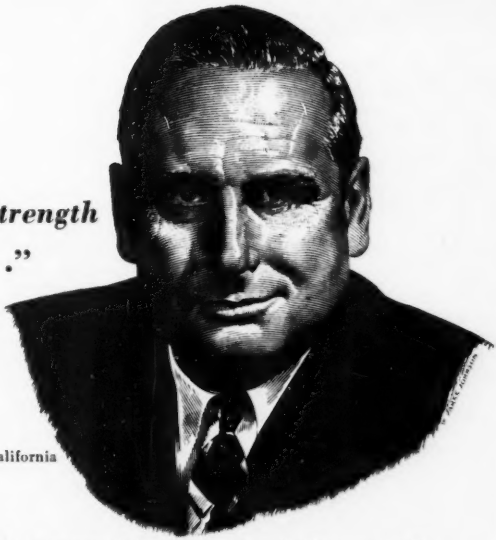
Write for full details.

OLIVER MACHINERY COMPANY
Grand Rapids 2, Mich.

Layout Ink Is Easy to Apply

Crown Industrial Products Co., 1031 Park Ave., Sycamore, Ill., has announced a layout ink packed in an aerosol container for the use of machinists, tool and diemakers, production layout men, and inspectors. Outstanding features of the ink are the time-saving method of application and the instantaneous drying. Packed and sealed under pressure, the ink is released by pushing a button on the top of the container, sending forth a fine spray. The ink, it is claimed, completely dries within 60 seconds to a smooth, hard, non-glare film that is resistant to cutting oils and heat. However, while it readily adheres to metal, glass, or wood, the ink may be easily removed with lacquer solvent, toluol, or xyol. The standard color of the ink is dark blue unless otherwise specified.

"Our Country's Strength Is Created . . ."



REESE H. TAYLOR
President, Union Oil Company of California

"Our country's strength is created by the responsibility and solidarity of individual citizens in a self-chosen government and economy. It can—and must—be perpetuated against all who seek to undermine it. The men and women who invest regularly in United States Defense Bonds are contributing to our national integrity and to the traditions of personal independence so characteristic of a free people."

Every pay day, 6,500,000 employed men and women . . . "are contributing to our national integrity and to the tradition of personal independence . . ." by the systematic purchase of United States Defense Bonds.

Let's look at a few figures:

- the cumulative purchases of 6,500,000 payroll savers add up to $130,000,000 per month.
- the number of individual "E" Bonds sold in 1951 totaled 68,069,000 pieces —8% more than in 1950.
- purchases of $25 and $50 E Bonds—the denominations popular with Payroll Savers were greater than the sales of $500 and $1,000 E Bonds.
- the *cash value* of Series E Bonds held by individuals on December 13, 1951, amounted to $34,727,000,000—$4.8 billions more than the cash value of Series E's outstanding in August, 1945.

For help with your Payroll Savings Plan, phone, wire or write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

MODERN MACHINE SHOP

NEW SHOP LITERATURE

Swiss Pattern Files. An eight-page catalog (No. 51-821) on Heller Swiss Pattern Files is now available from The DoAll Co., 254 N. Laurel St., Des Plaines, Ill. The catalog illustrates and describes diemaker files, machine files, needle files, and riffler files. Information concerning sizes and prices is included.

Reamers. The Gammons-Hoaglund Co., Manchester, Conn., now has available a catalog containing illustrated, descriptive, and complete tabular information, including sizes and prices, on helical taper pin reamers, helical duplex hand taper pin reamers, helical diemakers taper reamers, helical chucking reamers, Morse and Brown & Sharpe taper reamers, and helical end mills. Illustrations of special reamers are also included.

Automatic Roll Marker. Technical Bulletin No. 500-C covering its improved Model "C" automatic roll marker for screw machines has been issued by New Method Steel Stamps, Inc., 145 Jos. Campau St., Detroit 7, Michigan.

Hydraulic Presses. E. W. Bliss Co., 1375 Raff Rd., Canton, Ohio, has published a 36-page catalog (No. 30-A) describing and illustrating its complete lines of Hydro-Dynamic Presses. The catalog includes sections devoted to single-action housing and open-rod presses, double-action housing and open-rod presses, special function presses, material handling devices, and hydraulic cushions.

Automatic Contour Milling Machine. A six-page two-color bulletin (No. 1136) published by Onsrud Machine Works, Inc., 3924 W. Palmer St., Chicago 47, Ill., illustrates and describes the Onsrud Automatic Contour Milling Machine which is designed specifically for the aircraft industry for accurately milling, at high speed, such long dimension parts as spar beams and cap strips. The many unique features and specifications of the machine are clearly covered.

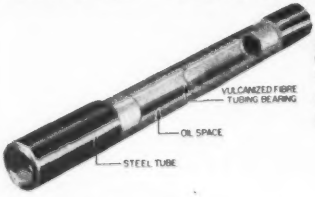
Straight Cutting Oils and Bases. To aid in the selection of the proper straight cutting oil or base for specific operations, E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa., has issued a four-page bulletin which presents general recommendations for the "Cut-Max" series of fortified and concentrated cutting fluids. It describes eight popular Cut-Max oils and bases and cites examples of typical dilutions.

Small Tools. Sid Tool Co., Inc., 126 Lafayette St., New York 13, N. Y., is now distributing a 16-page bulletin (No. 352) which contains illustrated, descriptive, and tabular information on high speed steel knurls; standard machine screw taps; spiral point taps; spiral point machine screw taps; standard hand taps; Shear Cut hand taps; Shear Cut machine screw taps; taper pipe taps; straight pipe taps; straight shank tapper taps; pulley taps; nut taps; tap and reamer wrenches; adjustable round split dies; die stocks; hexagon rethreading dies; tool post turrets; arbor presses; micrometer calipers; radius gages; counting machines; rotary index milling tables; milling attachments; drill press vises; angle vises with swivel bases; hex socket cap screws; shoulder screws or stripper bolts; heavy duty hand grinders; hack saw frames; and dial indicators.

SILENCE YOUR SCREW MACHINE DEPARTMENT

WITH

SMITH'S SILENT STOCK TUBE



Smith's Silent Stock Tube entirely eliminates nerve racking stock clatter. This is a complete unit simply installed by replacing present stock tube. Write today.

Some exclusive territories still open.

Distributed Exclusively by . . .

BA-PO COMPANY

P. O. Box 587 • Dayton 1, Ohio

Steel Selection. United States Steel Supply Division, United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill., has available a 1952-53 Stock List and Reference Book which contains a list of steel, tool, and machinery stocks with specifications and technical data on all steels, including alternate and tentative standard steels; descriptions of applications of alloy, stainless and carbon steels, plus a tubular product chart showing all types with characteristics and applications of each; and comprehensive reference charts and tables, as well as 16 tabs for quick product reference and color sections for special products.

Tool Stands. Monarch Metal Products, Inc., 724 S. Columbus Ave., Mt. Vernon, N. Y., now has available a bulletin (SE-950) which contains illustrations, descriptions, and specifications of a line of tool stands for factories, machine shops, toolrooms, office use, shipping and maintenance departments, laboratories, and other places.

"How to Store Coated Abrasives," an eight-page booklet explaining the best way to store coated abrasives in order to prevent deterioration and improve length of service, has been published by Armour & Co., Coated Abrasives Division, N. Benton Rd., Alliance, Ohio.

Carbide Manufacturer's Grade Recommendations. Adamas Carbide Corp., 1000 S. 4th St., Harrison, N. J., now has available a newly revised "Carbide Manufacturer's Grade Recommendations" chart which was prepared as a result of a survey made by the Carbide Industry Standardization Committee. Proper grade recommendations are indicated for chip removal on steel and non-ferrous materials for roughing cuts through precision boring. Wear and impact applications are also covered. A feature of the chart is the adoption of symbols C-1 through C-14 to indicate each specific application. The easily-read letter-size Chart CC is suitable for inserting in a three-ring notebook, posting, or reference filing.



Double Rivet Setter. Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill., has issued a broadside which illustrates and describes a double rivet setter with pneumatic control that provides an operator the choice of two sets of riveting centers.

Gear Chucks. An eight-page two-color catalog published by Garrison Machine Works, Inc., Dayton, Ohio, illustrates and describes Garrison Pitch Line Control Gear Chucks of custom-built designs. Facilities of the company for producing these chucks are discussed, and typical installations of the chucks are shown and briefly described.

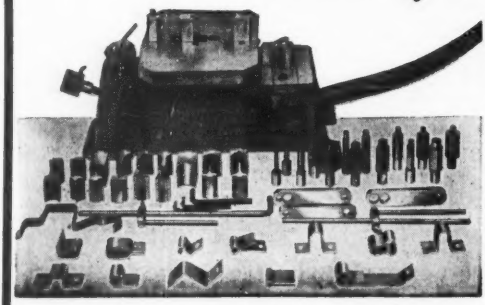
Decimal Equivalent Wall Chart. A 17 x 24-inch decimal equivalent wall chart which is said to be accurate to four decimal places and is printed in three colors, not just for attractive design but to indicate decimal equivalents of fractions, is now being offered by John Hassall, Inc., 394 Oakland St., Brooklyn 22, N. Y. The chart is framed by 88 interesting types of special cold-headed products manufactured by the company. Smaller hand size charts are also available on request.

All-Purpose Utility Lamp. Acme-Lite Mfg. Co., 401 N. Wood St., Chicago 22, Ill., now has available literature illustrating and describing the Acme-Lite "Magnetik" All-Purpose Utility Lamp with magnet base which is said to attach instantly to any steel surface, including surfaces of lathes, millers, shapers, drill presses, grinders, saws, punch presses, riveters, pneumatic tools, spray booths, infra-red drying ovens, shop benches, conveyors, steel shelving, and so on.

Instructional Wall Charts. Utica Drop Forge and Tool Corp., Utica 4, N. Y., is now offering two wall charts, one explaining how to use pliers and the other showing how quality tools are forged and electronically hardened. These charts, each 28 inches long x 10 inches deep, convey the message clearly by means of pictures and diagrams with quick-reading captions.

Gear Deburring Machine. An eight-page two-color catalog published by The Sheffield Corp., Dayton 1, Ohio, illustrates and describes the Sheffield Gear Deburizer for burring external gears (spur, helical, hypoid, and bevel), as well as multiple start worms.

YOUR SHOP NEEDS
THE *Multiform* BENDER



AIR OR HAND MODELS FOR UP TO
¼" x 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

• Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends — Cuts — Punches — Flats — Rounds Into Any Shape — Clamps — Brackets — Springs — Busbars — Wire Forms — Aircraft Work — Steel Rule Dies, Etc.

J. A. RICHARDS CO., DEPT 6 M KALAMAZOO, MICH.

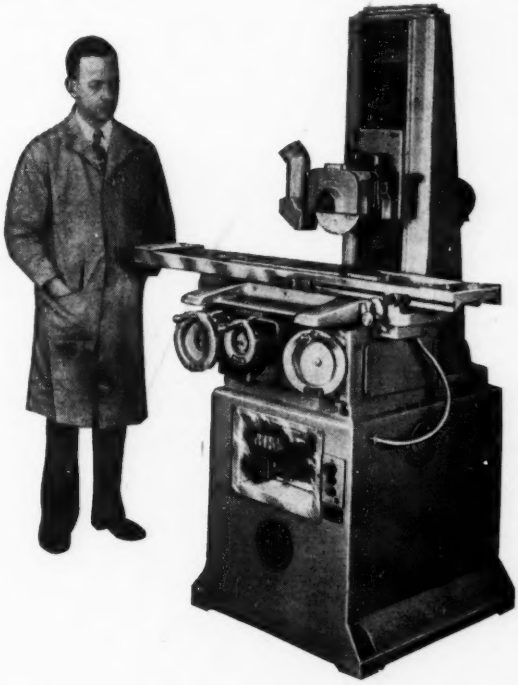
Vertical Millers and Profilers. Pratt & Whitney, Division Niles- Bement - Pond Co., West Hartford 1, Conn., has issued a 12-page two-color circular (No. 542) on P & W Vertical Millers and Profilers designed for the economical production-profiling of irregular shaped parts requiring accurate interchangeability. Construction details of the machines are fully covered, and specifications of the single and two-spindle models in which the machines are available are included.

"Specific" Standard Taps. A 36-page booklet available from Detroit Tap & Tool Co., 415 Boulevard Bldg., Detroit 2, Mich., lists the specific standardized taps offered by the company under each of six specific groups of materials for which the taps are specifically designed. Included are listings of taps for steel and other tough materials; for cast iron; for aluminum, magnesium, and other light materials; for zinc die cast metals; for brass; and for plastic materials.

Dust Collectors are described in detail in a 24-page catalog issued by Torit Mfg. Co., 296 Walnut St., St. Paul 2, Minn. Covered are both cabinet and cyclone type dust collectors in sizes ranging from ⅓ to 5 h.p. Also shown are a complete line of fitting and accsesories and a series of blueprint sketches giving the overall dimensions of each unit. The unusual adaptability of Torit Dust Collectors to meet specific problems and production setups is shown by means of numerous illustrations.

Collet Chuck. Sutton Tool Co., Sturgis, Mich., has published an eight-page two-color catalog describing its Levermatic Collet Chuck and showing and discussing a number of standard and special applications of the chuck.

"Abrasive Cutting" is the title of a 16-page catalog published by The Allison Co., 257 Island Brook Ave., Bridgeport 8, Conn., which includes data on the wet and dry cutting of various materials, as well as information on abrasive cutting machines and their maintenance. A unique color-coded chart presents recommendations for the selection of Allison rubber - bonded and resinoid - bonded wheels.

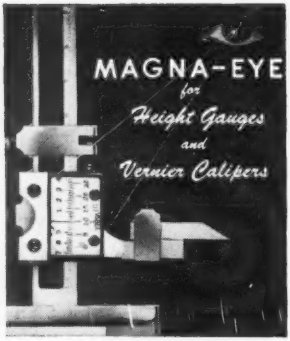


REID SURFACE GRINDER MODEL **618V**

WITH VARIABLE TABLE SPEED - 12 to 35 Feet Per Minute

REID BROTHERS COMPANY, INC.

BEVERLY - MASSACHUSETTS



New, Improved

MAGNA - EYE

. . . for Accurate, Effortless Reading of Vernier Scales on Height Gauges and Calipers.

The New Improved MAGNA EYE is a highly perfected precision instrument. It permits the user to view the hard-to-read vernier scales without eye strain or effort, eliminates errors —no more hit and miss reading; plugging and unplugging eye cups—read the vernier scale with both eyes open in the same position as your book or newspaper. MAGNA EYE is a time saver in any shop turning out high precision work.

Magnifies four times—MAGNA EYE is not an ordinary magnifier — it is optically perfect glass lens especially designed and developed to meet all requirements in reading the vernier scale—is provided with a focus limit stop to meet the individual vision requirements. It is built to last the life of the tool for which it is designed. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many, many others.

Made in three sizes to fit Starrett, Brown & Sharpe, Lufkin and other tools of similar design—S No. 100 for 6" vernier calipers; S No. 200 for 10"-12" height gages also 10"-18"-24" vernier calipers; S No. 300 for most popular type 18"-24" height gages and 36"-48"-60" calipers.

ASK FOR DEMONSTRATION IN YOUR OWN SHOP—
WRITE, CALL OR WIRE

STEBAR COMPANY
711 West Lake Street
MINNEAPOLIS 8, MINN.

Cutter Driving Device. The Cross Co., Detroit 7, Mich., has available descriptive literature on the new Cross-Drive, a cutter driving device featuring quick-changing, preset cutters, and precision control.

Bronze Maintenance Bars. A folder presenting complete size listings of fully machined ready-to-use 13-inch length bronze maintenance bars and fully machined solid bars is now available from Buckeye Brass & Mfg. Co., 6410 Hawthorne Ave., Cleveland 3, Ohio.

"How to Use Your New Beverly" is the title of a bulletin (No. IC-1051) published by Beverly Shear Mfg. Co., 3000 W. 111th St., Chicago 43, Ill., which contains helpful illustrated and descriptive information on the company's throatless shear, slitting shear, cable cutter, and inside slotter.

"Hardening Compound Carburizes, Nitrides and Chromizes Steel" is the title of a four-page booklet available from Doughty Laboratories, Inc., 500 Fifth Ave., New York, N. Y., which describes the means of application of the steel hardening chemical compound known as "Hard'N'Tuff" and discusses the resultant properties provided.

Swiss Automatic Screw Machines. Cosa Corp., 405 Lexington Ave., New York 17, N. Y., now has available a 32-page booklet covering the history and development of Swiss automatic screw machines and the contribution of Andre Bechler, Ltd., Mountier, Switzerland, in design for improving the operations and production of these automatic machines.

Bronze Weldrod and Wire Products. A colorful wall chart listing all of the Ampco bronze weldrod and wire products available by trade name, together with A.W.S.-A.S.T.M. designation, has been released by Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46, Wis. In addition, and opposite the trade names, are listed descriptive information, typical applications, mechanical properties, deposit chemical composition, recommended current and polarity, N.E.M.A. color markings, and diameter sizes. Also included is a copy of the "Bronze Electrodes Selecand Preheat Chart," providing an easy and convenient reference and check list. The chart is bordered with numerous application pictures with a brief description of each specific job.

Automatic Turret Lathes. An eight-page two-color bulletin (No. 145) issued by Potter & Johnson & Co., Pawtucket, R. I., illustrates and describes the "Speed-Flex" Model 3U Automatic Turret Lathe designed for the high speed automatic production of small parts. The company also has available a four-page two-color bulletin (No. 146) which contains illustrated, descriptive, and tabular information on the P & J Model Automatic Turret Lathe with swing over bed ways of 49-inch diameter.

Floating Disc Clutches. The Carlyle Johnson Machine Co., Manchester, Conn., has published an installation and data book (No. 51) on "Maxitorq" Floating Disc Clutches, available in eight sizes from ¼ to 15 h.p. at 100 r.p.m.; also, on the Maxitorq Automatic Overload Release Clutch. In addition, information is provided on special driving cups for pulley type, cut-off coupling, and ring type installations.

Keyway Broaches. The du Mont Corp., Greenfield, Mass., is now offering an eight-page two-color Catalog S which illustrates and provides complete specifications on the company's "Minute Man" line of 23 standard sizes of Keyway broaches and 21 standard keyway broach sets for the quick hand cutting of keyways from $\frac{1}{16}$ to 1 inch wide in any bore from ¼ to 3 inches in diameter. The catalog also contains useful ready reference information on keys and keyways. Other products described include arbor presses; push-type keyway broaches for multiple production; and the "Minute Man" Magnetic Base for the quick, convenient positioning of dial indicator gages.

Prepared Gas Atmospheres. An eight-page two-color illustrated bulletin (SC-155) on industrial applications of gas chemistry for heat treating has been released by Surface Combustion Corp., Toledo 1, Ohio.

Victor's Specials Deserve Your Attention!

High Speed Drills...EXTRA LONG LENGTH

Straight Shank No. 1-60

No. By Gage	Length Inches	Our Price Net Each
1 to 10	6¼	$1.00
11 to 20	5¾	.90
21 to 30	5⅜	.80
31 to 40	5¼	.70
41 to 50	4½	.60
51 to 60	3½	.50

Straight Shank

Size Inches	Length Overall Inches	Length Flute Inches	Price Each Net
1/8	12	9	$1.65
9/64	12	9	1.65
5/32	12	9	1.65
11/64	12	9	1.65
3/16	12	9	1.65
13/64	12	9	1.80
7/32	12	9	1.80
15/64	12	9	1.95
1/4	12	9	1.95
17/64	12	9	2.05
9/32	12	9	2.05
19/64	12	9	$2.25
5/16	12	9	2.25
21/64	12	9	2.50
11/32	12	9	2.50
23/64	12	9	2.75
3/8	12	9	2.75
25/64	12	9	3.05
13/32	12	9	3.05
27/64	12	9	3.30
7/16	12	9	3.30
29/64	12	9	3.60
15/32	12	9	3.60
31/64	12	9	3.60
1/2	12	9	3.60

IMMEDIATE DELIVERY

VICTOR MACHINERY EXCHANGE, INC.
DEALERS IN TOOL ROOM EQUIPMENT
251-B Centre St. • New York 13, N. Y. • Phone: CAnal 6-5575

Tapping Equipment. A six - page two - color brochure issued by Procunier Safety Chuck Co., Dept. 2, 12 S. Clinton St., Chicago 6, Ill., includes illustrations, cross-section diagrams, and parts charts of the company's complete line of high speed tapping heads. The brochure graphically analyzes the many working parts and construction features of these heads and includes a complete description of the "Tap King," a heavy duty tapping attachment for large size taps, as well as of the "Tru-Grip" Tap Holder which is designed to reduce tap breakage and increase speed and tapping accuracy.

Press Brakes. A 24-page, two-color catalog (B-51) issued by Verson AllSteel Press Co., 9310 S. Kenwood Ave., Chicago 19, Ill., provides design details and specifications of the complete line of Verson Press Brakes with capacities from 15 tons up. Both mechanical and hydraulic types are covered.

Radial Head Face Grinders. A catalog bulletin issued by Grinder Division, Besly-Welles Corp., Beloit, Wis., provides a complete cataloging of the full line of Besly-Bowen Radial Head Face Grinders which are available in three basic models using abrasive wheels from 6 to 18 inches in diameter, and which can be adapted to a wide variety of operations through the use of various available fixtures. The catalog bulletin presents complete specifications of the machines, as well as examples of cost-cutting grinder applications.

Tool Steel Blue Sheet. "Alhead," an improved die steel for cold heading dies, is the subject of a "Blue Sheet" published by Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa., which provides certified laboratory data on analysis, proper methods of handling and shop treatment, and complete physical properties, and so on, on this high alloy steel that can be water hardened exactly the same as straight carbon or carbon vanadium steels and provides for unusual wear resistance.

MODEL VH

Superior HONING HEAD



Adaptable to most drill presses for honing heavier work conveniently.

Range 3/16" to 3".

Size dial on bottom of head permits increasing or decreasing size while in operation. No stopping of spindle necessary. Lever on side releases stone from work and expands stone to same size under spring pressure on next part. Only adjustment necessary to duplicate size is for stone wear. *Write for folder.*

Superior HONE CORP.

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Abrasive-Belt Machines. The Porter-Cable Machine Co., 5072 N. Salina St., Syracuse 8, N. Y., has published a 32-page case study booklet on abrasive-belt machines. Included are numerous successful case studies indicating the broad potentialities of abrasive-belt machining. The booklet is also said to serve as a basic manual on the subject since it describes in general terms the relative advantages of abrasive-belt machining.

Permanent Magnets. A complete listing of stocked sizes and shapes of Carboloy Alnico permanent magnets is included in Bulletin PM-100 now available from Carboloy Department of General Electric Co., 11143 E. 8 Mile St., Detroit 32, Mich. The 20-page 8½ x 11-inch illustrated catalog contains pull curve and size information in tabular form on stocked types of Alnico permanent magnets, both cast and sintered, as well as size and application data on stocked holding assemblies, including sheet steel separators, magnetic retrievers, and magnetic stands. A list of available patterns for various sizes of cast Alnico bars, blocks, rods, rings and sleeves is included. The catalog also describes three types of Carboloy permanent magnet magnetizers. Tables of properties and tolerances in addition to ordering information and conversion tables are included to aid in applying and purchasing Alnico permanent magnets.

Button Head Socket Cap Screws. Thin heads, non-deforming sockets, and maximum strength are features claimed for the button head socket cap screws described in a four-page folder released by The Holo-Krome Screw Corp., Hartford 10, Conn. Intended as a brief, informative reference piece for designers, engineers, and production men, the folder highlights salient features and sizes of the button head screws.

Hydraulic Power Units. Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Boston, Mass., has published a four-page catalog section (No.400) illustrating and describing its line of hydraulic power units in single pump, double pump, and combination pump types. In addition to working drawings and specifications of the various sizes of pumps, the catalog section contains a listing of maximum pressures at a given horsepower and horsepower requirements at given pressures.



Adjustable Faceplate. A six-page two-color folder issued by Micro-Lathe Plate Co., 1265 W. 2nd St., Cleveland 14, Ohio, illustrates and describes the Micro Adjustable Faceplate and universal work-holding attachments which may be used on engine lathes, turret lathes, drill presses, milling machines, shapers, boring mills, and grinders.

Punches, Shears, and Bending Rolls. A 36-page catalog (No. 14E) now being distributed by Hendley & Whittemore Co., 110 Blackhawk Blvd., Beloit, Wis., contains illustrations, descriptions, and specifications of the company's Beloit line of metal-working machinery, including combined power punches and shears; alligator shears; power splitting shears; power rod cutter; power punches; combination punch, bar shear, angle shear and notcher; angle bending rolls; pyramid type bending rolls, initial type bending rolls; corrugated bending rolls; straightening rolls; slip roll hand forming machine; hand power combined punches and bar shears; hand power bar and angle shears; hand power splitting shears; etc.

"36th Annual Review of the Silver Market" is the title of a 31-page pocket-size booklet issued by Handy & Harman, 82 Fulton St., New York 38, N. Y., which presents information regarding the increasing use of silver in industry. Complete data regarding the silver situation, including imports and exports of silver into and from the United States, silver production, silver consumption, and average silver quotations, are included in the booklet.

Manual of Exhaust Hood Design. Engineered for metal-working industries, a 24-page two-color bulletin (No. 270-E1) published by American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky., contains factual information; tables on exhaust requirements; data on dust concentrations and weights of collected material; and 61 photographs illustrating hood designs and applications for the metal-working industries. Special sections cover polishing, buffing, grinding, and allied operations; portable and flexible shaft grinding and polishing; cast iron machining; automatic buffing; and oil mist control.



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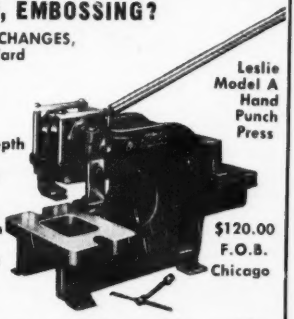
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Power Press Brakes, available in capacities from 120 to 1,000 tons for forming mild steel from $\frac{3}{16}$ to 1 inch thick and from 6 to 20 feet long, are described, illustrated, and listed as to specifications in an eight-page two-color bulletin (No. 107) issued by Columbia Machinery & Engineering Corp., Hamilton, Ohio.

"Maintenance Guide for Electric Heat Treating Furnaces" is the title of a 20-page manual prepared by Hevi Duty Electric Co., Milwaukee 1, Wisc., the purpose of which is to assist management and operators in the maintenance and use of electric furnaces. A handy check sheet is included in the manual to simplify maintenance schedules, reduce breakdowns, and prolong furnace life.

Hydraulic Cylinders. Identified as Catalog No. 200, Section 3, a 22-page catalog announced by Logansport Machine Co., 801 Center Ave., Logansport, Ind., presents complete data relative to the more recent engineering developments on the company's line of rotating and non-rotating hydraulic cylinders for a variety of pushing, pulling, lifting, or holding operations.

Sheet Steel and Plate Cutting Machinery. An eight-page two-color bulletin issued by American Pullmax Co., Inc., 2627 N. Western Ave., Chicago 47, Ill., illustrates and describes a complete line of machinery for cutting various gauges and thicknesses of sheet steel and plate.

Precision Cylindrical Grinders. Landis Tool Co., Waynesboro, Pa., is now offering a 28-page general catalog (CG-52) on its line of precision cylindrical grinders. Line sketches are provided to show typical operations that can be performed with each of the 22 different types of machines. Brief descriptions and specifications are included for the 175 various sizes of grinding machines listed.

"The Well-Springs of Profit." The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, has available, in booklet form, an address entitled "The Well-Springs of Profit" given by Frederick V. Geier, president of The Cincinnati Milling Machine Company, at the American Bankers Association Convention held last fall in Chicago, Illinois. Mr. Geier's address covers the relation of machine tools to our free enterprise system of life.



Ever since you were knee-high to a hop-toad, you've heard about America's wonderful *natural resources*—the bountiful fertile fields, the towering timber growth, the boundless water power, and the untold wealth of gold, iron, oil, silver, coal and other natural treasures that lie buried in the ground.

Is it because America has *more* natural resources than any other country that Americans enjoy the world's highest standard of living? No—many countries have as much—some have more.

Then is it because Americans *do* more with what they've got?

Yes! And the reason is as plain as the nose on your face. It's because Americans are free to develop their natural resources—and their natural resourcefulness—in the wholesome climate of *open and strenuous COMPETITION*.

COMPETITION—not "regimentation"—is what eggs a man on to do his best.

COMPETITION—not government control—is what urges a business to give its customers ever greater value for their money.

So let's say "NO SALE" to the *ism* peddlers who would have us swap our U. S. A. system of free competition for their "planned" regimentation—trade our U. S. A. freedom and plenty for their serfdom and poverty!

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THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER

Underdrive Press. Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill., has published a 12-page catalog on its line of single, double, and triple-action underdrive presses in which the clutch, brake, and other major drive components are placed on a level below the actual working area. Completely illustrated, the catalog contains detailed specification data and an explanation of the operating features of the presses, which have capacities of 400 tons and over.

Soldering and Brazing Equipment. An eight-page two-color catalog prepared by Metallizing Co. of America, 3520 W. Carroll Ave., Chicago 24, Ill., describes and illustrates Mogul Production Guns which are built to deposit lead and tin-base solders, silver solder, and brazing wires in a liquid or semi-liquid form to practically any constant moving part.

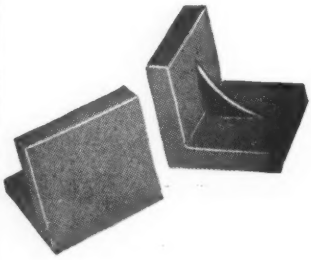
"Keep 'Em Working" is the title of a 12-page two-color bulletin (No. 39) released by The Rotor Tool Co., Cleveland 12, Ohio, which provides interestingly illustrated information on the maintenance, application and safe operation of Rotor High-Cycle Electric Tools.

Metal-Working Tools and Machinery. Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., has announced a new 52-page wire-bound edition of its catalog on metal-working tools and machinery. Designated as the No. 16-52, the catalog contains illustrated, descriptive, and tabular information on punches, shears, foot presses, foot shears, bending brakes, power presses, power shears, dies, and small tools.

Industrial Freezer, capable of producing and holding round-the-clock temperatures of as low as minus 165 deg. F. and designed for use in shrink fitting, hardening, stabilizing, and testing of metal parts, is illustrated and described in a four-page condensed specification bulletin issued by Industrial Division, Webber Appliance Co., Inc., Indianapolis 3, Indiana.

Open Back Inclinable Power Press. A 16-page bulletin (No. 215) released by Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill., contains illustrated, descriptive, and tabular information on a complete line of geared and non-geared open back inclinable power presses with capacities from 30 to 200 tons.

FROM STOCK



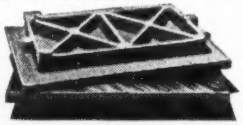
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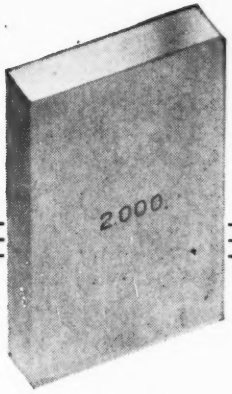
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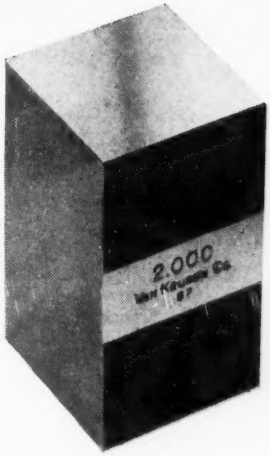
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Conventional Rectangular Gage Block. .360 by 1.375". Area .51 square inches. For ordinary use.	SOLID SQUARE MASTER BLOCK. 1¼" by 1¼". Area 1.56 square inches. The 30 Year Blocks.

Read about the startling wear tests on Van Keuren Solid Square Master Blocks.

They are unconditionally guaranteed against wear in excess of .0001" for 5 years for any reason whatsoever.

Write for your Van Keuren 1952 Catalog and Handbook No. 35

THE Van Keuren CO., 175 WALTHAM STREET, WATERTOWN, MASS.

33rd YEAR

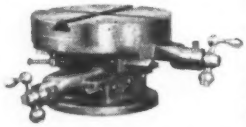
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires.

Carbide - Tipped Standard Tools. An eight-page two-color illustrated supplement (No. 5) to its catalog No. 50 has been announced by Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich. The supplement includes specifications and prices of standard turning, facing, threading, and boring tools, carbide-tipped with Carboloy and Kennametal and available with other leading carbides.

14½-Inch Lathe. A two-color bulletin (No. 5201) now being distributed by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., illustrates and describes in detail the South Bend 14½-Inch Swing Toolroom Precision Lathe. Other South Bend lathes are also illustrated and briefly described, as well as various lathe attachments.

Tap Grinding Machines and Attachments. Literature illustrating and describing tap grinding machines and attachments for converting twist drill grinders so that they will sharpen the tapered start of all the usual taps for right and lefthand threads is now available from Carl Hirschmann Co., 30 Park Ave., Manhasset, New York.

MASTERCRAFT Rotary Tables



Model 700-R is an improved combination slide and rotary table for use on either the miller table, drill press or lathe face-plate. Table 7½" dia. Rotates through 360°. Height 4¾" overall.

Write for circulars describing this and other models.

F & M SALES, Inc. 1054 Cahuenga Blvd. Hollywood 38, Calif.

"Air Power at Work" is the title of a 16-page two-color booklet published by Mead Specialties Co., Dept. NB-42, 4114 N. Knox Ave., Chicago 41, Ill., which presents case histories of 39 different production problems and how they were solved by a combination of Mead air devices set up to provide semi-automatic or automatic operations. Each different combination of work feeders, air presses, timers, values, and so on, is clearly covered by means of an illustration and a description of the specific operational method.

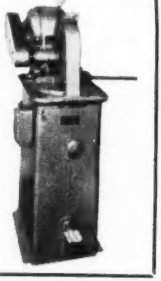
"Diamond Wheels Are Hard to Replace" is the title of a 12-page two-color booklet prepared by Norton Co., Worcester 6, Mass., for the purpose of helping users of diamond wheels to obtain maximum life and production from these products.

Production Tools. Commander Mfg. Co., 4224 W. Kinzie St., Chicago 24, Ill., has published a 12-page two-color catalog (No. 815) which contains illustrations, descriptions, and specifications of a line of production tools which includes the Commander Tapper, a ruggedly built tapping attachment with capacity for taps from No. 0 to ¾ inch; Commander Drill Chip Breaker, a production drilling attachment adaptable to No. 2 Morse taper and larger spindles; Commander Multi-Drill, an adjustable multiple-spindle drill head for drilling up to eight holes in one stroke; Commander Multi - Angle Drill Unit, a complete drilling head powered through flexible shafting that may be attached to a drill press or other source for angle drilling; and Commander Drilling Coolant Table, a precision ground work table with self-contained coolant system that can be easily mounted on practically any drill press.

THE NEW CATSKILL MODEL D-2 ABRASIVE CUT-OFF MACHINE

FOR TOOL STEEL, H.S.S., CAST IRON, BRONZE, BAKELITE PLASTICS, HARD RUBBER, ETC.
HEAVY DUTY UNIT FOR CONSTANT PRODUCTION

Write for complete data and specifications



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Also manufacturers of the Catskill Power Reaming Machine

Precision Tap Sharpening and Its Importance To You

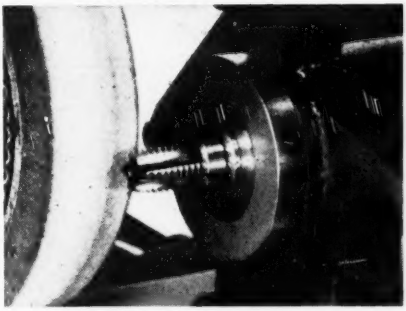
Precision tap sharpening is helping many manufacturers reduce tap costs up to 75%. It also enables them to get greatly increased production from each tap and makes possible a sharp reduction in tap breakage. It can benefit you, too!

WHAT PRECISION SHARPENING IS

Precision tap sharpening is a method of controlling the accuracy of tap indexing (keeping cutting edges uniform and evenly spaced), controlling the rake angle of cutting edges and providing uniform chamfers. These results enable a tap to cut more accurately and uniformly for a much longer period of time than is possible when the precision sharpening method is not used.

THE IMPORTANCE OF BLAKE EQUIPMENT

Until the introduction of Blake tap sharpening equipment a few years ago, no practical method was available to realize the benefits of precision sharpening. The Blake Flute Grinder and Blake Chamfer Grinder are recognized today as the only practical means of putting precision sharpening into actual operation.



TAP IN POSITION FOR PRECISION SHARPENING

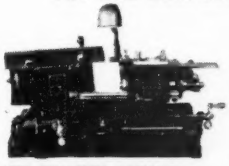
Photograph shows four-fluted tap in correct position for precision chamfer grinding on Blake Tap Chamfer Grinder.

SEND FOR MORE FACTS NOW!

A recent *Machinery* article, "Why Taps Should Be Sharpened Precisely", contains complete information on this interesting and profitable subject. Write us for your free copy. Bulletins about both Blake machines are also available on request.

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER
(Described in Bulletin 551)



BLAKE
FLUTE GRINDER
(Described in Bulletin 631)

ACCURATE, TRUE-CUTTING TAPS
LESS TAP BREAKAGE
600% MORE PRODUCTION PER TAP
UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

EDWARD BLAKE COMPANY 438 CHERRY ST., WEST NEWTON 65 MASSACHUSETTS

BLACK DIAMOND PRECISION DRILL GRINDERS...
WALTHAM CUTTER SHARPENERS...SURFACE FINISH STANDARDS

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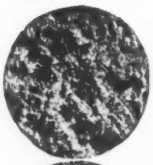
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ALL SIZE BLANKS IN STOCK.
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Prompt Delivery. *Write for quotation.*
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Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.
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NON-GRAN
CASTINGS • SAND & CENTRIFUGAL

CENTERLESS GRINDING — Straight cylindrical, shoulder, profile and multiple diameters, any material analysis; also non-ferrous materials. Accurately ground taper pins and straight dowel pins. Brown & Sharpe and Swiss Automatic screw machine parts, heat treated and ground if necessary. Light bench type production drilling. Expanded facilities insure prompt and accurate service. Send blue prints or samples for estimates. The Porter Machine Co., 3139 Enyart Ave., Cincinnati 9, Ohio.

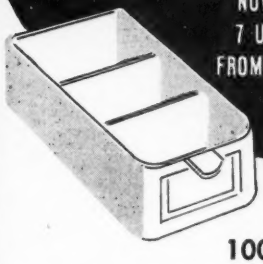
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Sales representative to go on factory payroll. Engineering education or equivalent. Knowledge of industrial hydraulics required. Submit detailed qualifications, experience, and education. Information will be held confidential and returnable in full. Write Box No. 51, Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio.

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7 USEFUL SIZES—
FROM 8 TO 64 DRAWERS



1001 Time-Saving Uses For Home and Business!

Ideal for small parts . . . washers . . . nails . . . screws . . . bolts . . . nuts . . . drills . . . taps . . . carbide tips . . . mounted points . . . tools . . . brads . . . tacks . . . and YOU NAME IT!

All-metal JIFFY Cabinets have a sturdy steel frame with hammered aluminum finish in silver-gray color.

Drawers are of solid aluminum, measuring 1¼" high, 2¾" wide and 5¾" deep. Individual metal drawer guides keep the drawers in a free-sliding position.

Each JIFFY Cabinet is supplied with its full requirement of removable drawer-dividers and index labels.

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Please Ship as Follows:

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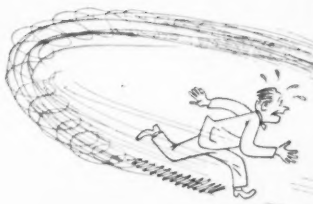
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There's One In Every Shop — *By Wesser*

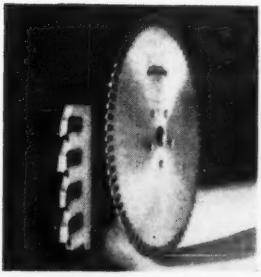


Why run around in circles— to find the Right Circular Saw?



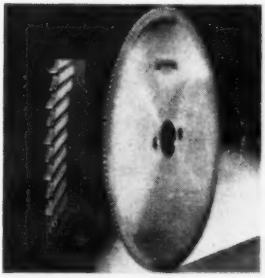
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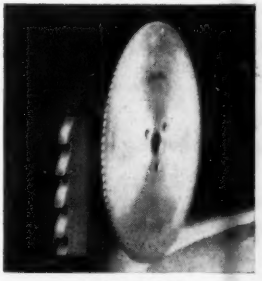
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For heavy production cutting, Simonds I. T. Saws are tops. Alternating square and beveled teeth "tri-vide" chips for easy cutting and clearance. An individual wedge securely anchors and aligns each tooth in the tough saw plate. What's more, this saw has maximum clearance for cool, free cutting . . . will stand an extremely high rate of feed . . . and teeth can easily be replaced singly or in complete sets right in your own plant by anyone of average mechanical ability.



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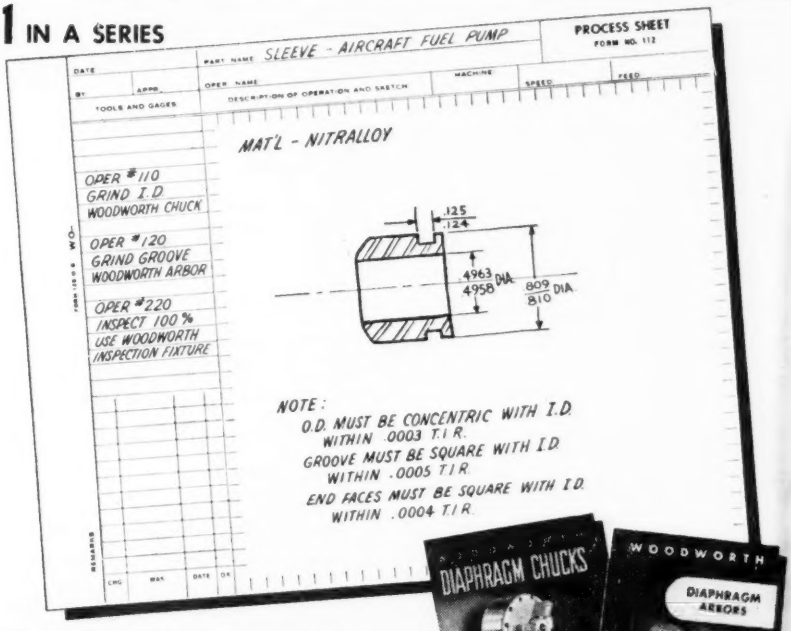
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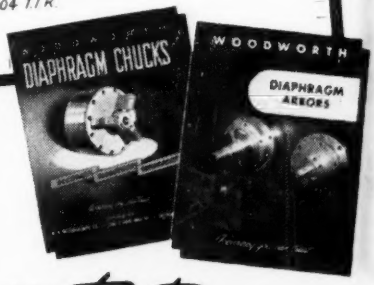
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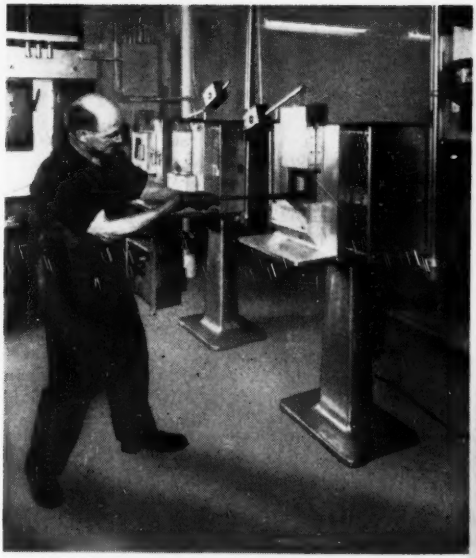
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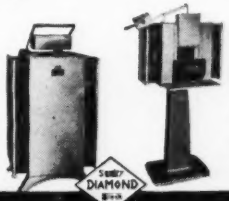
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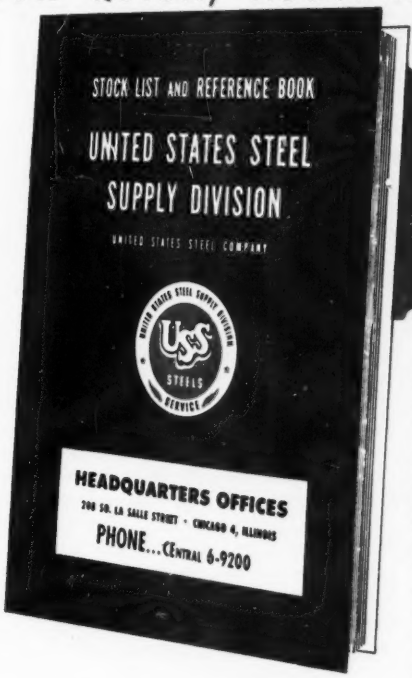
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Steel Issues

WE would surmise that by the time this editorial goes to press that millions of words will either have been written or spoken on the issues involved in the steel dispute, which leads us to believe that there might be little we could add to that which has already been said. It has, however, been interesting to observe both sides of the controversy and to find how widely divergent have been the solutions offered to the same problem as determined by the same set of statistics. One is even reminded of the anecdote regarding the blind men who, upon touching the various parts of the elephant, declared that the animal was any number of things far removed from the anatomical structure of the beast as a whole. In like manner, it seems that much of the controversy has dealt with mere segments of the real and vital issues.

From everything we have been able to learn from extensive reading of reports on the negotiations, two significant points, which we consider basic issues, have been buried under the heap of charges and countercharges. First, we have found but little emphasis on any "hold the line" policy and second, and probably most important, the playing down of the issue as to whether America is to continue as a land of liberty and freedom for all, or whether its economic future is to be dominated and controlled by an organized minority.

Each side, it seems, has regarded the ultimate settlement of the dispute in terms of both increased wages and increased prices. It may sound trite, but nevertheless there is a war going on—a war for which the Chief Executive declared a state of emergency to exist. A tremendously expensive defense program was initiated at the expense of taxpayers, steel workers included. A rise in steelworkers' wages now will only bring on a corresponding rise in steel prices too, with the net result that the defense program becomes more expensive than ever, along with higher taxes to pay for it.

Great as our economy is, and prosperous as it seems under present conditions, many of us aren't sold on the idea that the wage and price rise spiral can go on indefinitely without having a ruinous effect. The high tax levies imposed against large corporations have already caused one of the largest steel manufacturers in the midwest to cancel the construction of a new plant. Withdrawal from expanding and modernizing present facilities can seriously affect our economic position if a number of companies find themselves in the same position as this large steel company.

Steelworkers contend that they must "catch up" with the wages paid in the electrical machinery, automobile, rubber, and meat-packing fields. Actually, their wages have in the past increased in line with wages in these other industries. Now, however, with the wage increase recommended by the Wage Stabilization Board, their wages would be way out in front. If the increase is granted, obviously the race will be on to "catch up" with steel. We would like to ask the question: Is it an impossibility to adopt a "hold the line" policy at this late date during a so-called "state of emergency"?

Far more insidious than either a wage or price increase is the recommendation of the Wage Stabilization Board that the Government of the United States can and should use its powers to force an American to join a particular union in order to hold his job. Granting the beneficial re-

sults which have accrued through unions in many industries, no greater harm could befall American industry, the country as a whole, and particularly the workers themselves should a worker's freedom be thereby taken from him.

Many who read this will remember the days when workers, in order to get a job, were often forced to sign a paper agreeing not to join a union. The abolition of such a practice marked a new era in freedom for the worker, but how close he has come to losing it again through the action recommended by WSB. The "Yellow Dog Contract" would never be condoned today, neither should men be forced to join a particular union in order to obtain employment.

To make it compulsory for a worker to join a union is contrary to the principles that freedom-loving Americans have sacrificed so much to maintain. One step in the direction of compulsory membership would make it just that much easier to compel membership in other organizations. And let's not be fooled that it wouldn't be tried.

After you've rubbed the dust of other steel dispute issues from your eyes, consider carefully again the union shop proposal. It's one that will be tossed in again and again to harass otherwise agreeable discussions between industry and unions. Once it is forced upon industry, there will be no turning back, and another portion of liberty and freedom will have departed from the American way of life.

Looking Ahead

SPEAKING before the Westinghouse Machine Tool Forum in Buffalo last month, Frederick S. Blackall, Jr., President and Treasurer of the Taft-Pierce Manufacturing Company and President of the National Machine Tool Builders' Association outlined some of the problems which the metalworking field in general and the machine tool industry in particular may be faced with in the not too far distant future.

Referring to long-range defense planning, Mr. Blackall stated: "The problem is not a simple one. No machine tool stockpiling program, for example, can be effective if not indeed detrimental to our economy unless it includes detailed and wise procedures which will keep the reserve up to date and yet dispose of the periodically discarded surplus without at once prostrating the machine tool builder, and foisting unused but nevertheless obsolete machine tools upon American industry. But it seems obvious that the establishment of some sort of a permanently operating national machine tool reserve program is essential to our security. In an atomic age, time may not always be on our side.

"A stand-by plan of priorities should be enacted to provide for money, men, materials, and manufacturing—which could be invoked by executive order upon a moment's notice in time of need—a D-Day program to be kept constantly up to date —and one which will not be thrown into the discard as others have been, when the real pinch comes.

"Our tax laws, now largely a hodgepodge of administrative interpretation and legislative amendment, need to be overhauled with a forthright recognition of what is needed to keep a strong nation strong.

"The provision of our tax laws and regulations relating to depreciation allowances should be drawn in such manner as to stimulate rather than to discourage the constant modernization of our national industrial plant, not as an emergency measure for use only when the enemy is at the gates, but as a permanent cornerstone of tax policy. The shortsighted and arbitrary Internal Revenue restrictions which now prevent recovery, within a reasonable period, of capital invested in productive equipment, and in some cases prevent its recovery at all, should be removed without delay."

Fred W Vogel

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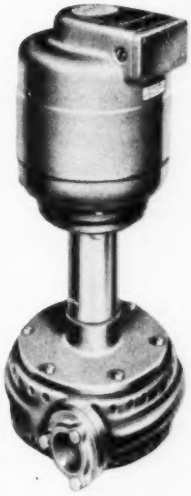
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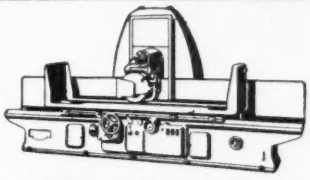
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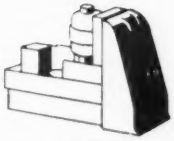
Disc Grinders,
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Vertical Spindle
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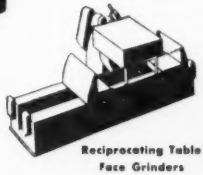
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Rotary Table
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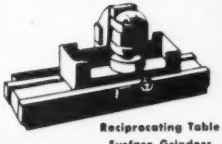
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Reciprocating Table
Face Grinders



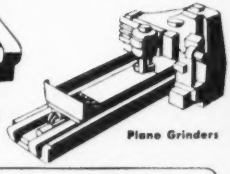
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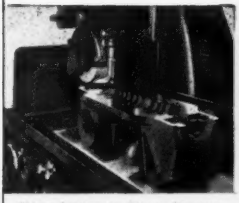
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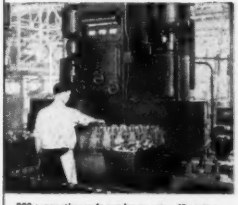
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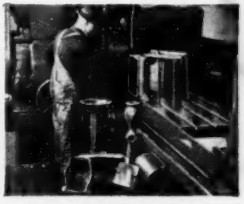
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These benches have many uses—as work benches or tables in production shops, assembly lines or shop offices. Now used in leading defense and industrial plants (names on request). Available in two sizes (23" x 46½", 28" x 60") in choice of two tops (Heavy Duty and Standard) with two, one, or no drawers, from *$26.80 up, f.o.b. factory, Quincy, Illinois. *Send for special illustrated folder giving complete specifications and prices.*

New HEAVY DUTY SOLID CORE WOOD TOPS

With highly compressed hardboard outside surface panels that are extremely resistant to abrasive wear and indentations. These panels are resilient, tough, warp-proof, splinter-proof, lacquered and waxed for oil and grease resistance.

OTHER FEATURES!

include extra-heavy rolled steel frames, adjustable feet for uneven floors, easy-sliding drawers.

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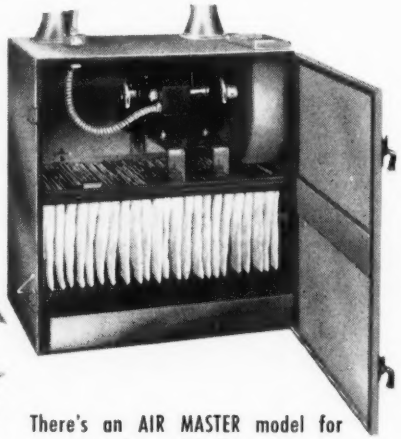
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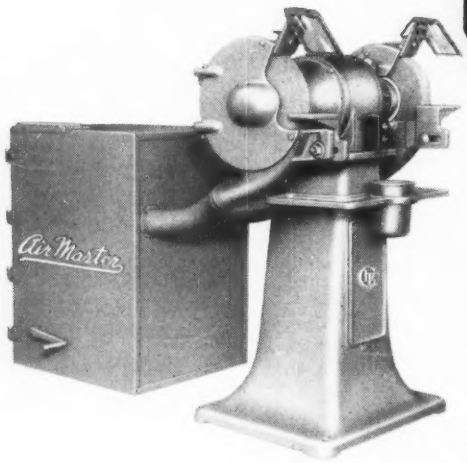
AIR MASTER Says STOP

to Harmful Grit!

Grit is the enemy of costly machines, and of manpower, too. Put a stop to this menace with the AIR MASTER.

Trapped as they leave the wheel of your grinder or buffer, flying particles are filtered out by fabric and steel wool bags. Only grit-free air is discharged. AIR MASTER is self-contained, ruggedly built for long years of trouble-free service.





There's an AIR MASTER model for every grinder and buffer. Give your plant this protection NOW!

Write today! Ask for name of your distributor or Bulletin 52-TA.

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DRILLS,
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THE CINCINNATI ELECTRICAL TOOL CO.

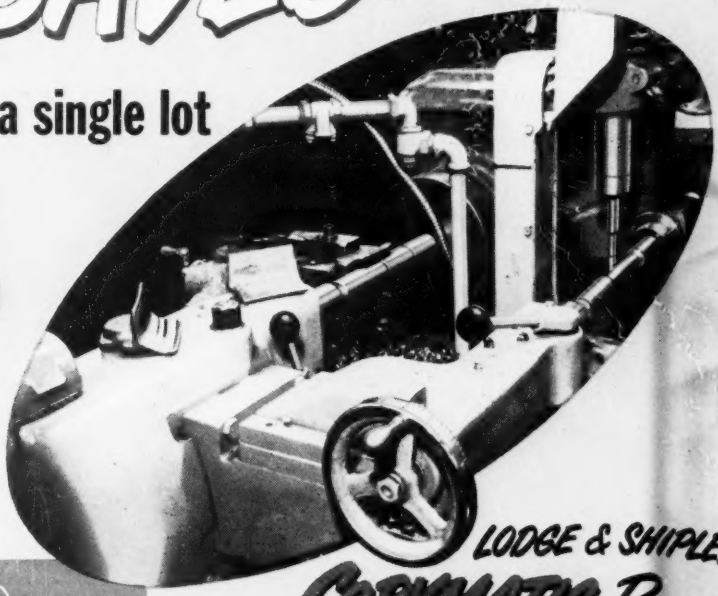
Division of THE R. K. LeBLOND MACHINE TOOL CO.

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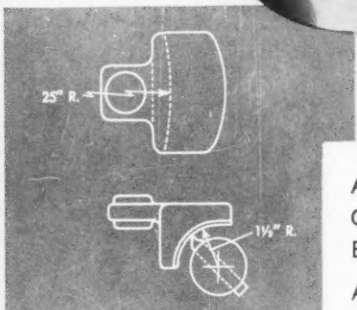
$8,000 on a single lot

87½% of production time!



LODGE & SHIPLEY
COPYMATIC Record

. . . at Lockheed Aircraft Corp., Burbank, California

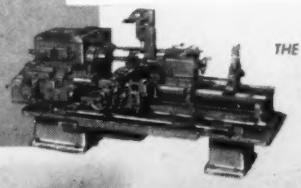


Typical Lockheed COPYMATIC application: Engine mount ring lug is machined with a compound radius (3" dia. by 50" dia.). Lug is No. 8740 forged steel. Note that part is clamped on tool carriage, tool is rotated at 651 RPM, 500 surface feet per minute; feed is .006" per rev.

Another outstanding example of the Lodge & Shipley COPYMATIC quickly paying for itself was recorded at the Burbank plant of this world-famous aircraft manufacturer.

A new method of machining the engine mount ring lug utilizes the versatility of the new Lodge & Shipley Lathe, permitting an amazingly simple setup, a bare minimum of tooling. The former method required twenty minutes per part . . . now approximately 2½ minutes per part. Savings amounted to approximately $8,000 for the total lot.

You, too, can use the COPYMATIC profitably. Write for details.



THE **Lodge & Shipley** COMPANY

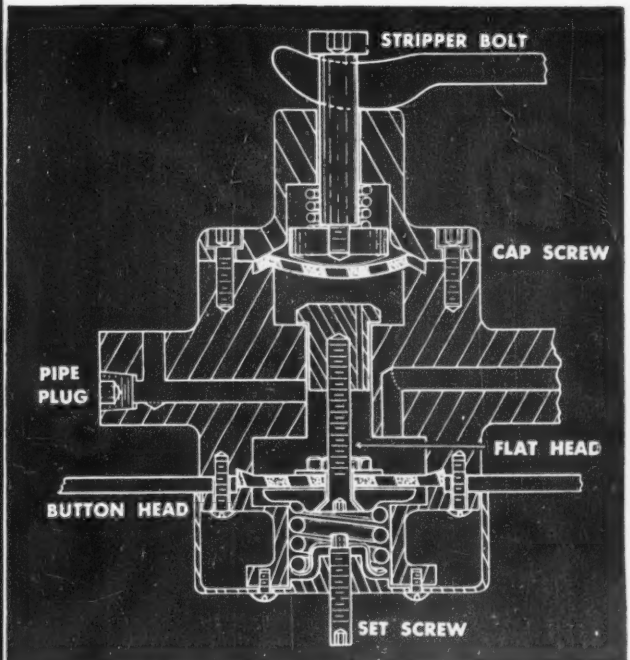
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IS THIS *YOUR* FASTENING PROBLEM?

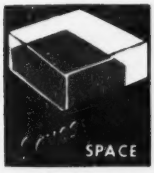
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Specify *standard* Holo-Krome Socket Screws because HK Internal Wrenching permits maximum tightening and all Holo-Krome products are guaranteed to give Unfailing Performance.

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